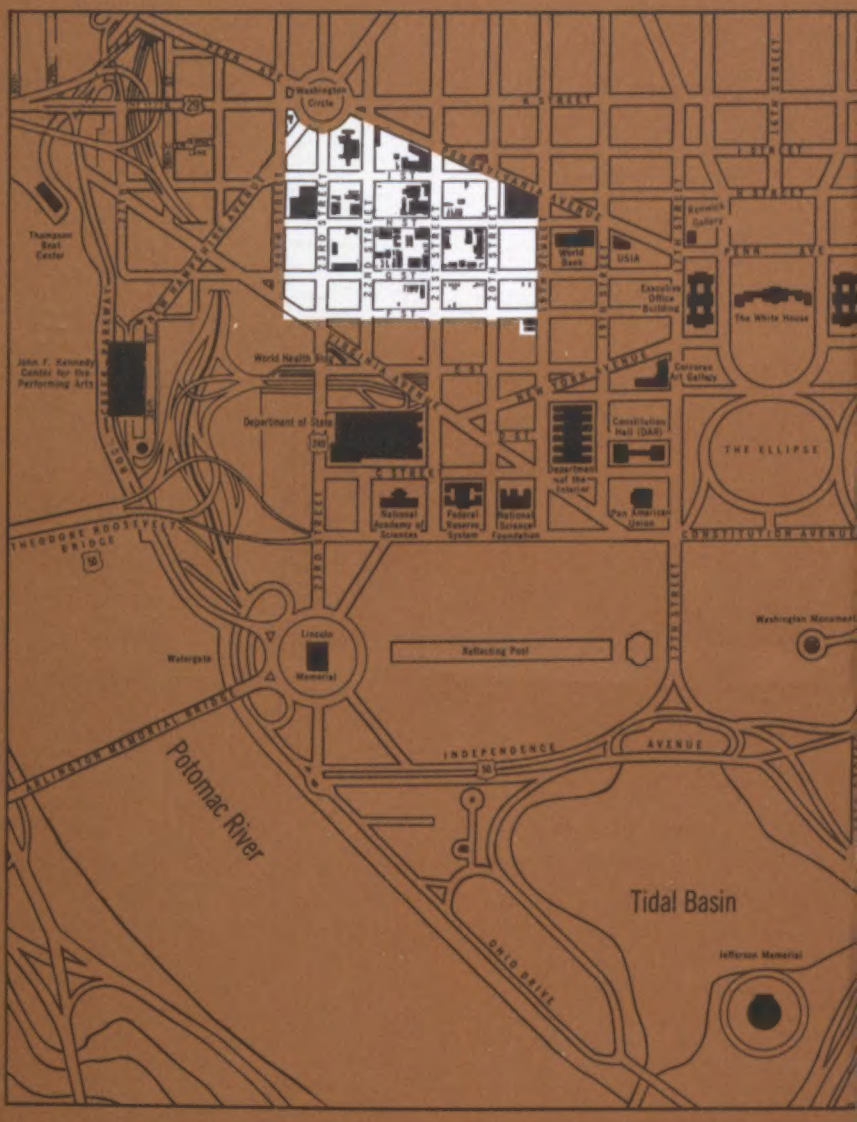
The George Washington University Bulletin



UNDERGRADUATE
AND
GRADUATE
CATALOGUE
1974-1975



THE GEORGE WASHINGTON UNIVERSITY CAMPUS / WASHINGTON, D. C.

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THE GEORGE WASHINGTON UNIVERSITY BULLETIN

UNDERGRADUATE AND GRADUATE CATALOGUE 1974-75

Arts and Sciences, Education, Government and Business Administration, Public and International Affairs

This catalogue lists the programs and faculties of Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs.

It also contains information on the Division of University Students, in which students may register for University courses for credit or as auditors without pursuing degree programs.

For information concerning the University's programs and faculties in Engineering and Applied Science, Law, and Medicine and Health Sciences request the appropriate catalogue.

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UNIVERSITIES are undergoing change, either drastically or slowly, a they have been for centuries. Whatever the changes, the one premise o which universities are based remains constant: universities are for learnin —for acquiring learning, for transmitting learning, and for the exploratio that yields new learning. Any other objective is unworthy of a university and any other purpose is incompatible with the student and his relationshi to the institution.

The faculty, through scholarship and research, extends learning, and i transmits learning by teaching. The student learns from the faculty, th library, and the laboratory—if he accepts, as he must accept, learning a his objective. This learning does not take place in a vacuum; in additio to the particular content of learning, the student will develop certain habit of mind—analytical thinking, powers of insight, self-examination, and th use of rational discourse—that will serve him throughout his personal an professional life.

Within this basic context, George Washington University invites th student to take up his residence in order that his energies, interests, an talents may be directed to learning.

Exceptional opportunities for learning are made possible because of th University's location in the heart of the nation's capital. For example cooperative programs are conducted in various fields of study with mem bers of Congress, the Smithsonian Institution, the Library of Congress the National Gallery of Art, and other federal and private organizations In addition to these programs, Washington presents opportunities for ob servation, study, service, and recreation limited only by the student's tim energy, and imagination.

In this atmosphere, George Washington University seeks to provide matrix for learning not available in the standard university education, s that no graduate can ever forget that as a student he was at the center o things and that he must forever carry additional responsibility in and fo society, because of the opportunity that was his.

LLOYD H. ELLIOTT
President
The George Washington Universit

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AUGUST 1974

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1974 FALL SEMESTER

August 26	Orientation for students from foreign countries *Monday*
August 27	Placement tests, advising, and orientation for entering freshmen who did not attend Summer Advance Registration Sessions *Tuesday*
August 28	Placement tests and advising for transfer students *Wednesday*
†*August 29–31*	Registration *Thursday-Saturday* Application for February graduation due as part of registration
September 2	Labor Day (holiday) *Monday*
September 3	Classes begin *Tuesday*
September 4	University Faculty Assembly Meeting *Wednesday*
September 13	Faculty Senate Meeting *Friday*
September 27	Application for October Ed.D. Comprehensive Examinations due *Friday*
October 4	School of Public and International Affairs Faculty Meeting *Friday*

* This calendar is subject to change.

† Registration is conducted alphabetically according to the first letter of the student's surname. The alphabetical breakdown and the hours of registration will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

FACTS ABOUT GEORGE WASHINGTON UNIVERSIT

General Information	Private, nonsectarian, coeducational, founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of Students	15,359 (9,694 men, 5,665 women)
Number of Undergraduates	5,173 (2,904 men, 2,269 women)
Geographical Origin of Students	50 states, District of Columbia, 101 countries
1974-75 Tuition	Undergraduate: $2,425 for two semester graduate: $90 for each semester hour (se page 28)
Number of Full-time Faculty	875 (78% with Doctoral degrees)
Number of Part-time Faculty	308 (includes some of the most distinguished men in Washington who serve as professorial lecturers)
Residence Hall Space	1,820
Room and Board	Cost varies from $1,515 to $1,645 for th academic year (see page 55)

Undergraduate majors: Accounting, Allied Health Science (Physician's Assistant) American Civilization, American Literature, Anthropology, Applied Mathematic Applied Statistics, Art History, Biology, Botany, Business Administration, Cartog raphy, Chemistry, Chinese Language and Literature, Chinese Studies, Civil Engi neering, Classical Archaeology and Anthropology, Classical Archaeology an Classics, Classical Humanities, Dramatic Art, Economics, Electrical Engineering Elementary Education, English Literature, Environmental Health, Environmenta Studies, Fine Arts, French Language and Literature, Geodesy, Geography, Geology Germanic Languages and Literatures, History, International Affairs, Journalism Judaic Studies, Latin, Latin American Studies, Mathematical Statistics, Mathematic Mechanical Engineering, Medical Technology, Music (Applied, History and Litera ture, Theory), Oceanography, Philosophy, Physical Education, Physics, Politica Science, Premedicine, Psychology, Public Affairs, Religion, Russian Language an Literature, Russian Literature and Culture—in Translation, Secondary Educatio Sociology, Spanish American Literature, Spanish Language and Literature, Speec Communication, Speech Pathology and Audiology, Urban Affairs, Zoology.

Study leading to graduate or professional degrees is offered in the Graduate Schoo of Arts and Sciences, the National Law Center, the School of Medicine and Healt Sciences, the School of Engineering and Applied Science, the School of Educatio the School of Government and Business Administration, and the School of Publi and International Affairs.

THE UNIVERSITY

HISTORY

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the federal city. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company, "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended a "fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical

School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half-century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he hoped to see established.

PURPOSE AND OBJECTIVES

The purpose of The George Washington University was to realize "the aspirations of Washington, Jefferson, and Madison, for the erection of a university at the seat of the Federal Government." Over the years it has been the aim to develop the University ideal in the Nation's Capital with a view toward meeting the changing needs of society while continuing to pursue the traditional principles of learning and research.

The George Washington University now rededicates itself and all the resources at its command to the pursuit of knowledge and its dissemination. To this end:

The University recognizes its special opportunities in and obligations to one of the principal capitals of the world. It is a primary objective of the University to utilize its historical, geographical, and functional relationship to the Nation's Capital and the Washington community in continuing the development of a great nationally and internationally oriented university.

The University recognizes the needs of our times and accepts the challenge to develop each student's potential abilities to the fullest extent.

The University is and should remain privately controlled, nonsectarian, and co-educational.

Admission to the University is determined only in terms of the personal character and academic qualifications of the candidates.

A broadly based liberal education is fundamental to the total program of the University.

Expansion of graduate and professional studies and research and the utilization for this purpose of the excellent research facilities and materials available in the Nation's Capital are basic to the continuous development of the University's educational program.

The provision of superior instruction and facilities and the application of high standards of entrance qualifications and academic achievement to all students whether full-time or part-time, on-campus or off-campus, are major missions of the University.

A balanced program of student extracurricular activities is an integral part of the University program.

The University will continue to strive to meet the evident needs of an enlarged student body while governing the size of enrollment by its capacity to supply adequate staff and facilities for the excellent teaching and research which it espouses.

THE COLLEGES, SCHOOLS, AND DIVISIONS

George Washington University includes twelve colleges, schools, and divisions, as follows:

*Columbian College of Arts and Sciences** offers four-year programs in the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. The College also provides prelegal and premedical programs, and the preprofessional work required for admission to the School of Education and to the School of Public and International Affairs. Columbian College has academic jurisdiction over the off-campus programs leading to the degrees of Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Geodetic and Cartographic Science, and Bachelor of Science in Oceanography. These off-campus programs are administered by the College of General Studies.

The Graduate School of Arts and Sciences† offers advanced study and research leading to the degrees of Master of Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Forensic Sciences, Master of Music, Master of Science, Master of Science in Forensic Science, Master of Science in Special Studies, Master of Science for Teachers, and Doctor of Philosophy. The degrees of Master of Arts in Special Studies and Master of Science in Special Studies are also available through off-campus programs administered by the College of General Studies.

The School of Medicine and Health Sciences†† offers work leading to the degree of Doctor of Medicine. The School is also offering programs of study leading to the undergraduate degrees of Associate in Science (Medical Laboratory Technique), Associate in Science (Medical Service Technology), Associate in Science (Nuclear Medicine), Associate in Science (X-ray Technology), Bachelor of Science in Allied Health Science (Physician's Assistant), Bachelor of Science in Environmental Health, and Bachelor of Science in Medical Technology.

The National Law Center‡ offers courses leading to the degrees of Juris Doctor, Master of Laws, Master of Comparative Law, Master of Comparative Law (American Practice), and Doctor of Juridical Science; and special programs in Continuing Legal Education.

The School of Engineering and Applied Science offers courses leading to the degree of Bachelor of Science in the following areas: Civil Engineering, Electrical Engineering, and Mechanical Engineering. Graduate programs lead to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. The School has academic jurisdiction over the off-campus programs leading to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. These off-campus programs are administered by the College of General Studies.

The School of Education offers undergraduate programs leading to the degrees of Bachelor of Arts in Education and Bachelor of Science in Physical Education; graduate studies leading to the degrees of Master of Arts in Education, Master of Arts in Teaching, Education Specialist, and Doctor of Edu-

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* Columbian College of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Bachelor of Arts and Doctor of Medicine.
† The Graduate School of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Master of Science and Doctor of Medicine and a dual program leading to the degrees of Doctor of Medicine and Doctor of Philosophy.
‡ The National Law Center cooperates with the School of Public and International Affairs in offering a program leading to the combined degrees of Juris Doctor and Master of Arts.

cation. The degree of Master of Arts in Education is also available through off-campus programs administered by the College of General Studies.

The School of Government and Business Administration offers undergraduate programs leading to the degrees of Bachelor of Business Administration and Bachelor of Science in Health Care Administration; graduate programs leading to the degrees of Master of Arts in Government, Master of Arts in Health Care Administration, Master of Business Administration, Master of Public Administration, Master of Urban and Regional Planning; the Post-Master's Graduate Certificate in Health Care Administration; the degrees of Doctor of Business Administration and Doctor of Public Administration. The School also has academic jurisdiction over off-campus programs leading to the degrees of Bachelor of Science in Administration and Master of Science in Administration. These off-campus programs are administered by the College of General Studies.

The School of Public and International Affairs‡ offers undergraduate programs leading to the degree of Bachelor of Arts and graduate programs leading to the degree of Master of Arts.

The College of General Studies supplements the adult education program of the University through campus and off-campus study; conferences, seminars, and special projects; and continuing education and noncredit programs. This College also administers the off-campus programs over which Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Engineering and Applied Science, the School of Education, and the School of Government and Business Administration have academic jurisdiction.

The Division of University Students makes available courses for students not candidates for degrees in this University.

The Division of Experimental Programs.

The Summer Sessions.

ACADEMIC STATUS

George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

The National Law Center is a charter member of the Association of American Law Schools and is approved by the Section of Legal Education and Admissions to the Bar of the American Bar Association. The School of Medicine and Health Sciences is a member of the Association of American Medical Colleges and is one of the medical colleges which have been continuously approved by the American Medical Association. Curricula of the School of Engineering and Applied Science in Civil, Electrical, and Mechanical Engineering are accredited by the Engineers' Council for Professional Development. The School of Education is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education for its Bachelor's and Master's degree programs. The School of Government and Business Administration has maintained full membership in the Middle Atlantic Association of Colleges of Business Administration since 1961. It joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of the American Assembly of Collegiate Schools of Business. The programs in Public Accounting designed to prepare students for Certified Public Accountants examinations

have been approved by the state boards of New York and of Maryland. The program in Hospital Administration is accredited by the National Accrediting Commission on Graduate Education for Hospital Administration. The Department of Chemistry is on the approved list of the American Chemical Society. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The program in speech pathology and audiology is accredited by the Education and Training Board of the American Boards of Examiners in Speech Pathology and Audiology

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the United States Information Agency, the Corcoran Gallery of Art, the Department of State, the Department of the Interior, the General Services Administration, the National Academy of Sciences, and the John F. Kennedy Center for the Performing Arts.

GOVERNMENT

The University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the President of the University is an ex officio member. The members of the Board are named for a period of three years and are divided into three classes. The members of one class are elected at each annual meeting to fill the places of the members whose terms of office expire. Two members of each class are nominated by the Alumni Association.

THE UNIVERSITY LIBRARIES

The Library collections of the University are housed in the University Library, the general library of the University, and in the libraries of the National Law Center and the School of Medicine and Health Sciences.

These collections contain approximately 600,000 volumes, to which are added some 35,000 volumes a year. Endowments supplementing the University appropriation provide books in the fields of American civilization, American literature, foreign service, history, public finance, and the social sciences; and gifts from many sources have enriched the collections. The Libraries currently receive about 6,000 periodicals.

Information concerning the use of the Libraries may be obtained at the Library service desks.

The Library is administered for the curricular, reference, and recreational needs and interests of the students. Instruction in the use of the library is given upon request by the reference librarians. The Library endeavors to assist students and all members of the University to use the rich library resources of Washington and the unusual opportunities they offer for extensive research. Interlibrary loan arrangements are maintained with other libraries in the city and throughout the United States.

The student has access to the Library of Congress, the Public Library of the District of Columbia and its branches, the libraries of the Pan American Union, the Bureau of Railway Economics, the U.S. Department of Agriculture, the Smithsonian Institution, the National Library of Medicine, and many of the

other great special collections of the government departments. Graduate students at George Washington University may, upon application, be issued a Consortium library card which permits direct borrowing from the libraries of the other Consortium institutions.

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Harold Frederick Bright, Ph.D., *Provost and Vice President for Academic Affairs*
Carl James Lange, Ph.D., *Assistant Vice President for Research*
Carl Hugo Walther, M.C.E., Ph.D., *Assistant Vice President for Academic Affairs*
Seymour Alpert, B.A., M.D., *Vice President for Development*
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John Herbert Strandquist, B.A., *Assistant Vice President for Administration*
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James Joseph Feffer, B.A., M.D., *Vice President for Medical Affairs*
William David Johnson, B.S., *Director of Planning and Budgeting*
Louis Harkey Mayo, B.S., J.S.D., *Vice President for Policy Studies and Special Projects*

* The President of the University, the Vice President for Academic Affairs, the Registrar of the University, the Director of Admissions of the University, and the University Librarian are ex officio members of all faculties of the colleges and schools of the University.

Frederick Justin Naramore, B.S., C.P.A., *Comptroller*
Neal Barnett Berryman, B.B.A., *Assistant Comptroller*
William Parkhurst Smith, Jr., B.A., M.B.A., M.A. in Ed., *Vice President for Student Affairs*

Boris Constant Bell, M.S. in P.E., *Director of the Cloyd Heck Marvin Center*
Ray Clements, Ph.D., *Adviser to International Students*
Robert Faris, B.S., *Director of Athletics*
Sal Fiscina, M.D., *Director of the Student Health Service*
Tomi Flory, *Director of Personnel Services*
Frederick Russell Houser, M.A., *Registrar*
Robert Gean Jones, B.D., Ph.D., *University Marshal*
Elmer Louis Kayser, Ph.D., LL.D., *University Historian*
Marianne Ruth Phelps, M.S., M.A., M.Phil., *Dean of Students*
Joseph Young Ruth, B.A., *Director of Admissions*
Ellwood Anthony Smith, B.S. in Ed., *Director of Alumni Relations*
John Roland Wilson, M.A., *Director of Public Relations*
Rupert Woodward, B.S., B.S. in L.S., M.A., *University Librarian*

THE COLLEGES, SCHOOLS, AND DIVISIONS

Calvin Darlington Linton, Ph.D., *Dean of Columbian College of Arts and Sciences*
Henry Solomon, Ph.D., *Dean of the Graduate School of Arts and Sciences*
Philip Stanley Birnbaum, M.S. in M.E., B.C.E., *Dean for Administrative Affairs of the Medical Center*
Ronald Paul Kaufman, B.S., M.D., *Dean for Clinical Affairs of the Medical Center; Medical Director of the University Hospital*
John Patrick Naughton, B.S., M.D., *Dean for Academic Affairs of the Medical Center*
Robert Kramer, B.A., LL.B., *Dean of the National Law Center*
Harold Liebowitz, D.Ae.E., *Dean of the School of Engineering and Applied Science*
Rodney Tillman, Ed.D., *Dean of the School of Education*
Peter Vaill, B.A., D.B.A., *Dean of the School of Government and Business Administration*
Burton Malcolm Sapin, Ph.D., *Dean of the School of Public and International Affairs*
John Gage Allee, Jr., Ph.D., *Dean of the Division of University Students*
Eugene Ross Magruder, M.B.A., Ph.D., *Dean of the College of General Studies*
William Francis Edward Long, Ph.D., *Dean of the Summer Sessions*
Clarence Cowan Mondale, Ph.D., *Director of the Division of Experimental Programs*
Lawrence Thompson Bowles, M.D., Ph.D., *Associate Dean for Curricular and Student Affairs of the Medical Center*
Fred Leonard, Ph.D., *Associate Dean for Research of the Medical Center*
Michael McCally, M.D., Ph.D., *Associate Dean for Allied Health Programs of the Medical Center*
Dennis Sophian O'Leary, B.A., M.D., *Associate Dean for Professional Services of the Medical Center*

W. Wallace Kirkpatrick, B.A., LL.B., *Associate Dean of the National Law Center*
Edward Andrew Potts, B.A., LL.B., *Associate Dean of the National Law Center, for Graduate Studies, Research, and Projects*
Robert Lee Holland, Ph.D., *Associate Dean of the School of Government and Business Administration*
Charles McKay Chambers, Ph.D., *Associate Dean of the College of General Studies, for Planning and Development*
Alvin Carl Jensen, Ed.D., *Associate Dean of the College of General Studies*
Calvin Trexler Klopp, B.A., M.D., *Medical Director of the University Clinic*
Barbara Joan Dunham, M.A., *Assistant Dean of Columbian College of Arts and Sciences*
Joseph Louis Métivier, Jr., M.A., *Assistant Dean of Columbian College of Arts and Sciences*
Robert Clinton Rutledge, Ph.D., *Assistant Dean of Columbian College of Arts and Sciences*
Harry Elwood Yeide, Jr., Ph.D., *Assistant Dean of Columbian College of Arts and Sciences*
Edward Alan Caress, Ph.D., *Assistant Dean of the Graduate School of Arts and Sciences*
David Alton Rowley, Ph.D., *Assistant Dean of the Graduate School of Arts and Sciences*
Margaret Gallagher, B.S.N., M.A., *Assistant Dean for Nursing Services and Director of Nursing of the Medical Center*
Robert Keimowitz, M.S., M.D., *Assistant Dean for Admissions and Director of Admissions (M.D. Program) of the Medical Center*
Winfield Harker Scott, Ph.D., *Assistant Dean for Education and Director of Education of the Medical Center*
Galip Mehmet Arkilic, Ph.D., *Assistant Dean of the School of Engineering and Applied Science*
Robert Edward Baker, M.A., Ed.D., *Assistant Dean of the School of Education*
John Lobuts, Jr., B.S., Ed.D., *Assistant Dean of the School of Government and Business Administration*
Bjorn Karsten Netland, M.A., *Assistant Dean of the Division of University Students*
Ruth H. Osborn, Ed.D., *Assistant Dean of the College of General Studies, for Continuing Education for Women*

COMMITTEES OF THE UNIVERSITY 1973-74

COMMITTEE ON FEDERAL EDUCATIONAL ALLOWANCES

A.E. Burns (*Chairman*), H.F. Bright, C.D. Linton, C.H. Walther, L.H. Elliott (*ex officio*)

COMMITTEE ON RESEARCH

A.E. Burns (*Chairman*), J.T. Bennett, H.F. Bright, Julian Eisenstein, A.M. Freudenthal, C.J. Lange, Fred Leonard, Martha Rashid, D.G. White

COMMITTEE ON RESEARCH ON HUMANS

C.J. Lange (*Chairman*), I.H. Cisin, J.W. Hillis, B.I. Levy, A.E. Parrish, Martha Rashid

COMMITTEE ON RELIGIOUS LIFE

R.G. Jones (*Chairman*), J.G. Boswell, R.H. Davison, L.P. Leite, H.M. Sachar, Five Student Members

COMMITTEE ON SPONSORED RESEARCH

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COMMITTEE ON THE UNIVERSITY BOOKSTORE

C.H. Pfuntner (*Chairman*), Joseph Foa, S.R. Paratore, Monroe Hurwitz (*ex officio*), Randolph Munt (*ex officio*), Three Student Members

COMMITTEE ON JUDICIAL SYSTEM

L.H. Harris (*Chairman*), Linda DePauw, R.M. Dunn, Jr., Three Student Members

COMMITTEE ON STUDENT PUBLICATIONS

A.E. Claeyssens, Jr. (*Chairman*), Lilien Hamilton, A.J. Mastro, Philip Robbins, W.E. Schmidt, F.J. Naramore (*ex officio*), David Speck (*ex officio*), Michael Winship (*ex officio*), Six Student Members

STUDENT-FACULTY COMMITTEE ON APPEALS

Elyce Ferster (*Chairman*), N.K. Khatcheressian, J.P. Reesing, Jr., C.T. Stewart, Jr., Four Student Members

COMMITTEE ON UNIVERSITY PARKING

J.C. Einbinder (*Chairman*), Victor Cohn, C.R. Naeser, Donald Novak, Carol St. Cyr, D.C. Speck, J.H. Strandquist, C.H. Walther, C.E. Diehl (*ex officio*), Joseph Mello (*ex officio*), Randolph Munt (*ex officio*), Four Student Members

COMMITTEE ON ANIMAL FACILITIES

W.L. Joseph (*Chairman*), W.P. Fortune, Kun-Yen Huang, M.J. Jackson, L.W. Thompson, R.D. Walk, B.C. Zook, C.J. Lange (*ex officio*), Fred Leonard (*ex officio*)

THE FACULTY SENATE 1974-75

Jeffrey Marshall Albert
Guy Black
John Gordon Boswell
Marcella Brenner
*Harold Frederick Bright
Halla Brown
Marie Mullaney Cassidy
Raymond Sheary Cottrell, Jr.
Marvin Eisenberg
*Lloyd Hartman Elliott
*James Joseph Feffer
Raymond Richard Fox
Phillip Donald Grub
Louis James Harris
Peter Proal Hill
Herman Hedberg Hobbs
*Frederick Russell Houser
*Robert Kramer
*Harold Liebowitz
Carl Arne Linden
*Calvin Darlington Linton
Arnold Charles Meltzer
John Andrew Morgan, Jr.
Charles Rudolph Naeser
Ralph Clarke Nash, Jr.
*Burton Malcolm Sapin
Stefan Otto Schiff
William Edward Schmidt
Lois Green Schwoerer
Walton Edward Smith
*Henry Solomon
†Edwin Lockwood Stevens
*Rodney Tillman
Neofytos Theodore Tsangaris
*Peter B. Vaill
Reuben Esselstyn Wood

Teresa Moran Schwartz, *Parliamentarian*

* Ex officio member.
† Chairman of the Executive Committee.

GENERAL INFORMATION

Admission

THE UNIVERSITY ACCEPTS BOTH MEN AND WOMEN. Students are admitted at the beginning of each semester and summer session.

The right is reserved to refuse admission to any student with an academic record which creates doubt of his ability to succeed in college or who, for any other reason, would not be an acceptable student. In the selection process, there is no discrimination because of sex, race, color, creed, or national origin.

An application for admission to degree candidacy should be accompanied by a $10 (for undergraduate study) or $25 (for graduate study) application fee.* The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of his last registration at this University and who has not since registered at another institution.

Applicants are urged to submit the application form and complete credentials well in advance of the semester for which they seek admission.

All credentials submitted in support of an application are treated confidentially and the contents are disclosed only to authorized individuals. Such credentials become the property of the University and cannot be returned.

UNDERGRADUATE ADMISSION†

Forms for application for admission or readmission are available at and should be returned to the Office of Admissions, George Washington University, Washington, D.C. 20006.

SECONDARY SCHOOL STUDENTS

Applicants who wish to begin college in the fall semester or in either the first or second term of the summer session *should* apply during the fall term of the senior year in high school. Preference will be given to students who submit applications and required credentials prior to March 1. Students graduating at mid-year who wish to begin college in the spring semester *should* apply no later than December 1.

* Application fee must be by check or postal money order, payable to George Washington University.
† For detailed admission requirements, see the appropriate college or school in this Catalogue. Tests required for admission and Educational Testing Service information are described on pages 68-69 and 35. See page 26 for admission requirements for students from foreign institutions.

Although decisions on most applications for the fall semester will requir submission of seventh-term grades and senior-year test scores, an earlier de cision will be given after September 1 to a student whose application become complete with a secondary school record through the junior year and junior year test scores, provided these records clearly establish admissibility.

Early Admission Plan.—Unusually well-prepared students who have com pleted the junior year in high school may be considered for admission if they submit special credentials and have the unqualified recommendation of their principal or counselor. Inquiries should specifically mention the Early Admis sion Plan.

An applicant from a secondary school must arrange to have sent directly from his school to the Office of Admissions a complete academic record to gether with a personal evaluation and recommendation from his principal. This information may be supplied on a form provided by the University or on a standard form used by the secondary school, provided all essential information is included.

TRANSFER STUDENTS

Undergraduate transfer students from other institutions should submit applica tion and required credentials prior to June 1 for the fall semester, December 1 for the spring semester, May 1 for the first summer session, and June 1 for the second summer session.

The transfer student must be in good standing as to scholarship and conduct. He must be eligible to return to the last previously attended institution in the semester for which he seeks admission to this University. A student who has been academically dismissed or suspended more than one time will not normally be considered for admission.

An applicant who has attended one or more institutions of higher learning must request *each* registrar to mail directly *to the Office of Admissions* a tran script of his record, ***even though credits were not earned.***

If an applicant has fewer than 30 semester hours of acceptable work (*C* or better on academic work from an accredited institution at the time the applica tion is submitted), he must request that his high school record and College Entrance Examination Board test scores be sent to the Office of Admissions.

If high school units are not shown on the college transcript, the applicant must request that his high school record be sent to the Office of Admissions.

ADVANCED TUITION DEPOSIT

Upon notification of acceptance, a $100 advanced tuition deposit will be re quired of all full-time undergraduate students including those readmitted. The deposit is credited toward tuition and is not refundable.

ADVANCED STANDING AND ADVANCED PLACEMENT

CREDIT FROM HIGHER INSTITUTIONS

Where there is no duplication involved either through course work or exami nation, advanced standing may be granted for work successfully completed at accredited institutions of higher learning. It will be granted only when it meets the requirements for the degree sought at this University and may be allowed

provisionally. Work of low pass grade (*D* or the equivalent) will not be considered for transfer.

Except for students transferring to the School of Government and Business Administration from a 2-year or junior college in which case no more than 60 semester hours credit may be assigned, there is no strict limit to the total amount of credit that may be assigned. However, a student must satisfy the residence requirement for the degree sought at George Washington University.

CREDIT BY EXAMINATION

Assuming there is no duplication of course work earned, a maximum of 30 semester hours of credit may be assigned for each or any combination of the following:

COLLEGE ENTRANCE EXAMINATION BOARD ADVANCED PLACEMENT TESTS (APT)

Credit is assigned for examinations passed with scores of 4 or 5 on the basis of a score report sent to the Office of Admissions from the Educational Testing Service at the student's request. Examinations passed with scores of 3 will be considered for credit or placement if the student arranges to have the examination paper sent to the Office of Admissions. The Advanced Placement Tests are administered in the secondary school in May of each year. Normally only students who complete a course designated as Advanced Placement are prepared for the examination. Arrangements for the examination are the responsibility of the applicant and should be made with the Program Director, College Entrance Examination Board Advanced Placement Examinations, Box 592, Princeton, N.J. 08540, or Box 1025, Berkeley, Calif. 94701.

COLLEGE ENTRANCE EXAMINATION BOARD COLLEGE-LEVEL EXAMINATION PROGRAM (CLEP)

Credit is assigned for the General Examinations passed at the 50th percentile or above (college sophomore norms) with the following restrictions: (1) a student must have been out of secondary school for three or more years and must not have been enrolled in any regular college program during that time to be eligible for credit and (2) no credit will be assigned for the English Composition examination. Credit is assigned for the Subject Examinations passed at the level recommended in the College Board model policy. Arrangements for the examinations are the responsibility of the applicant and should be made with the College Entrance Examination Board College-Level Examination Program, Box 592, Princeton, N.J. 08540.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES SPECIAL DEPARTMENT EXAMINATIONS

A student may request permission from any of the academic departments to take an examination prepared by the department in a specific subject. Permission is not automatically granted; the student must offer evidence that he has sufficient background to have a reasonable command of the subject-matter. Awarding of credit for the examinations will be based on the department's evaluation of the examination paper.

CREDIT EARNED THROUGH UNITED STATES ARMED FORCES INSTITUTE (USAFI)

Except for those students enrolled as candidates for the Bachelor of Busine Administration degree, credit is assigned for approved United States Arme Forces Institute college-level examinations passed with satisfactory scores.

CREDIT FROM SERVICE SCHOOLS

A limited amount of credit may be assigned for selected service school i struction received since 1941. No more than 30 semester hours may be assigne for a combination of service schools and examinations referred to abov Veterans should submit to the Office of Admissions photostatic copies of the service school records, indicating courses successfully completed with sufficien identification of the course to locate it in the *Guide to Evaluation of Educ tional Experience in the Armed Forces.*

ADVANCED PLACEMENT

Advanced placement or waiver of a requirement will be granted on the basis o scores on Achievement Tests of the College Entrance Examination Board a follows:

Achievement Test	Minimum Score	Exemption
English Composition	650	Waives Engl 10
English Composition	680	Waives Engl 11 or 12
European and/or American History	600	Waves Hist 39-40 and/or 71-72
French	650	Waives a two-year languag requirement
German	600	
Hebrew	600	
Latin	600	
Russian	700	
Spanish	650	

GRADUATE ADMISSION*

Graduate School of Arts and Sciences.—Forms for application for admissio or readmission are available at the Office of the Dean of the Graduate Schoo of Arts and Sciences, George Washington University, Washington, D.C. 20006 Completed applications and requests for fellowship support must be submitte by February 15 (February 1 for students in Clinical Psychology and Ar Therapy) for admission in the fall semester and by November 1 for the sprin semester. Applications for graduate study are acceptable after these dates fo admission in the corresponding semester and will be reviewed if time permit and if space is available in the program desired.

School of Education.—Forms for application for admission or readmissio are available at the Office of the Dean of the School of Education, Georg Washington University, Washington, D.C. 20006. When completed, these ap plication forms should be submitted to this Office no later than June 1 for th fall semester, November 1 for the spring semester, April 1 for the summer ses sions.

* For detailed admission requirements, see the appropriate college or school in this Catalogue. Se page 26 for admission requirements for students from foreign institutions.

School of Government and Business Administration.—Forms for application for admission or readmission are availabe at the Office of the Admissions Officer, School of Government and Business Administration, George Washington University, Washington, D.C. 20006. When completed, application forms for Master's degree programs should be submitted to this Office no later than July 1 for the fall semester, November 1 for the spring semester, May 1 for the first summer session, and June 1 for the second summer session; those for doctoral programs should be submitted by June 1 for the fall semester, October 1 for the spring semester, and April 1 for both summer sessions.

School of Public and International Affairs.—Forms for application for admission or readmission are available at the Graduate Admissions Office, School of Public and International Affairs, George Washington University, Washington, D.C. 20006. When completed, these application forms should be submitted to this Office no later than March 1 (February 1 for applicants for graduate assistantships and foreign applicants). Admission is for the fall semester only. All credentials, including transcripts from all institutions attended, Graduate Record Examination scores, and letters of reference, must be received before the deadline date.

DIVISION OF UNIVERSITY STUDENTS ADMISSION*

Forms for application for admission to *nondegree* status in the Division of University Students are available at and should be returned to the Office of Admissions, George Washington University, Washington, D.C. 20006. When completed, these application forms, with credentials when required, should be received by the Office of Admissions no later than the Friday before the first day of registration (see Calendar, pages 5-7). No application fee is charged to process an application for admission to this Division. For detailed entrance requirements, see pages 178-79.

Registration in a given course may be denied students in this Division when space is needed for degree candidates.

READMISSION

A student previously registered in the University who was not registered on campus during the immediately preceding semester (summer session excluded), must apply for readmission. Final dates for applying are the same as those for "Undergraduate Admission" (see pages 21-24), or "Graduate Admission" (see pages 24-25). If the student applies as a degree candidate and was previously registered as a nondegree student, or if he has attended one or more higher institutions during his absence from the University, he must have complete official transcripts sent to the appropriate office at this University from each institution attended. Applications for readmission are considered on the basis of regulations currently effective.

The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of his last registration at this University and who has not since registered at another institution.

* See page 26 for admissions requirements for students from foreign institutions.

STUDENTS FROM FOREIGN INSTITUTIONS*

Application, required records, and scores on the *Test of English as a Foreig Language* (see below) must be received from *foreign applicants* no later tha March 1 (February 1 for applicants for graduate study in the School of Publi and International Affairs) for the fall semester and November 1 for the sprin semester.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send *directly* t the appropriate office (see "Undergraduate Admission," pages 21-24, or "Grad uate Admission," pages 24-25), official credentials listing subjects studied, grade received, examinations taken, and degrees received. Certified copies of di plomas and certificates from secondary schools and all colleges and universitie attended are required. Records of state examinations and certificates are also needed. All records become the property of the University and *cannot* be re turned.

LANGUAGE TEST

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language*. Students are responsible for making arrange ments for taking the test and should address inquiries to: TOEFL, Educational Testing Service, Princeton, New Jersey 08540, U.S.A. The completed applica tion form should be returned to the Testing Service at Princeton well in ad vance of the beginning of the semester for which the applicant seeks admission. The test fee, which should be remitted with the application, entitles the student to have his test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does *not* constitute application for ad mission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a descrip tion of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and an application blank. On the application for the test, the student should specify that the scores be sent to the appropriate office at this University (see "Under graduate Admission," pages 21-24, or "Graduate Admission," pages 24-25).

In addition to the TOEFL, an admitted student may be required to report to the Admissions Office to make arrangements for taking an English Placement Test for foreign students prior to registration. Results of this test will determine the courses the student will be permitted to register for in his program of study.

TRANSFER WITHIN THE UNIVERSITY

For information concerning transfer from one college, school, or division to another within the University, see pages 45-46.

* For detailed admission requirements, see the appropriate college or school in this Catalogue. Testi required for admission and Educational Testing Service information are described on pages 69, 135, and 179.

Registration

THE DATES, HOURS, AND PLACE OF REGISTRATION will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

A student cannot register for classes until he has received a letter of admission to the University issued by the appropriate admitting office.

No registration is accepted for less than a semester or one summer session.

A student may not register concurrently in this University and another institution without the prior permission of the dean of the college, school, or division in which he is registered in this University. Registration in more than one college, school, or division of the University requires the written permission of the deans concerned, *prior to registration*. Allowance of credit for work done concurrently at another institution is at the discretion of the appropriate committee.

ELIGIBILITY FOR REGISTRATION

Registration for the following categories of campus students is held on the days of registration stated in the University Calendar. A student who is suspended or whose record is not clear for any reason is not eligible to register. Registration in a given course may be denied students in the Division of University Students when space is needed for degree candidates.

New Student.—Upon receipt of a letter of admission, the new student is eligible for registration on the stated days of registration.

Readmitted Student.—A student previously registered in the University who was not registered for campus courses during the preceding semester or summer session must apply for and receive a letter of readmission from the appropriate admitting office before he is eligible for registration. A student registered for the spring semester of 1974 need not apply for readmission for the fall semester of 1974. Such a student is a "Continuing Student."

Continuing Student.—The student registered for campus courses in the immediately preceding semester of the academic year is eligible to register upon presentation of his Registration Card from the previous semester. The student registered for the 1974 Summer Sessions campus courses, and not restricted to summer registration, is eligible to register for the 1974 fall semester on presentation of his 1974 Summer Sessions Registration Card.

REGISTRATION CHANGES AND WITHDRAWALS (See pages 32, 45)

REGISTRATION FOR CONSORTIUM COURSES

Students interested in taking courses at any of the other institutions in the Consortium of Universities of the Washington Metropolitan Area, Inc. (see page 50), should consult the program announcements of the other institutions. Consortium application forms and instructions are available from the Registrar after the student has obtained his registration packet. In order to participate in the Consortium program (1) the graduate student must obtain the approval of his adviser and should ascertain from the department of the institution where the course is taught whether or not he is eligible for the course and whether there is a space in the class *or* (2) the undergraduate stu-

dent must obtain the approval of his adviser and *must* ascertain from the de partment of the institution where the course is taught whether or not he i eligible for the course and whether there is space in the class. Specific in quiries should be addressed to the Registrar.

Fees and Financial Regulations

FEES PAID BY STUDENTS cover only a portion of the cost of the operation of the University. Income from endowment funds, grants, and gifts from alumni and friends of the institution make up the difference.

The following fees and financial regulations were adopted for the 1974 summer sessions and the academic year 1974-75. (See page 30 for projected tuition increases for 1975-78.)

Tuition Fees

For undergraduate study in Columbian College of Arts and Sciences, the School of Education, the School of Government and Business Administration, the School of Public and International Affairs; and for courses taken on campus by undergraduate students in the College of General Studies:

Full-time program (12 to 18 hours), each semester	$1,212.50
Part-time program or hours in excess of 18, for each semester hour	90.00

For graduate study* in the Graduate School of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs; and for courses taken on campus by graduate students in the College of General Studies (Exception: doctoral students registered prior to July 1, 1967, who wish to continue payments according to the plan (see below) in effect prior to that date):

For each semester hour for which a student registers	90.00

For students registered in the Division of University Students:

For each semester hour for which the student registers	90.00

For students registered for doctoral degrees† in the Graduate Council (now the Graduate School of Arts and Sciences) and the School of Government and Business Administration prior to July 1, 1967, who wish to continue payments according to the plan in effect prior to that date:

For work leading to and including the general examination	2,425.00
For work leading to and including the final examination	2,425.00

For students registered for the Doctor of Education degree‡ prior to July

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* Payment of tuition for a Master's thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted in accordance with the regulations of the school in which the student is registered.

† The tuition fee is to be paid at the rate of $606.25 a semester or in full at the beginning of each stage of the doctoral discipline. No "continuous registration" fee will be charged if a third year is needed for completion of either part of the degree requirements. If still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.

‡ As long as there is an unpaid balance for the part of the program on which the student is working, he must make at least the minimum tuition payment of $303.25 at each fall and spring registration (and for any summer session in which he registers for academic work).

If the total fee is paid for the part of the program on which the student is working, he may continue to register, without additional fee, for courses approved by his Master in Research, until the expiration of the time allowed for that part of his program.

1, 1967, who wish to continue payments according to the plan in effect prior to that date:

For work leading to and including the major field examination	$3,035.00
For work leading to and including the final examination	1,815.00

University Center Fee (charged all students registered on campus,* nonrefundable)

For students registered for 11 or more semester hours on campus:	
Each semester	43.00
For students registered for less than 11 semester hours in a semester on campus:	
For each semester hour for which the student registers	4.00
For students maintaining "continuous registration" status:	
Each semester	4.00

Additional Course Fees

In certain courses additional fees, such as laboratory and material fees, are charged as indicated in the course descriptions. These fees are charged by the semester and, unless otherwise indicated, may be defrayed in two payments when the tuition is paid in this manner. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the laboratory fee, the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Associate in Arts	$10.00
Bachelor's, Master's, Education Specialist, Doctor's degrees	25.00
Post-Master's Graduate Certificate in Health Care Administration	25.00
Fee for Binding Master's Thesis	10.00
Fee for Microfilm Service and Printing Announcement of Final Examination (Doctor candidates)	60.00

Residence Hall Fees (see page 55)

Special Fees and Deposits

Application fee (undergraduate degree candidate), nonrefundable	10.00
Application fee (graduate degree candidate), nonrefundable	25.00
Advanced tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student	100.00
Housing deposit, nonrefundable, charged each applicant for residence hall space	100.00
Admission tests (when required)	6.00–12.00
National Teacher Examinations fee, for Bachelor of Arts in Education degree candidates	9.00–13.00
Late-registration fee, for failure to register within the designated period	15.00
Late-payment fee, for failure to make payments when due (see "Payment of Fees," page 31)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," page 31)	35.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds	15.00

* Students in the College of General Studies are charged the University Center Fee only when registered for courses on campus.

Continuous Registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements*—due and payable on the official days of registration	$90.00
For special physical examination	2.00
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25.00
For each examination to qualify for advanced standing and for each special examination	5.00
English test for foreign students (when required)	5.00
Laboratory checkout fee, for failure to check out of Chemistry laboratory by the date deadline set by the instructor†	3.00
Transcript fee, for each transcript of record	2.00

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES 1975-78

In order that students and their parents may plan more realistically for a total four-year period, tuition increases for the academic years 1975-76, 1976-77, and 1977-78 have been estimated as follows:

Increase by year (full-time undergraduate students):	
1975–76	$ 75.00
1976–77	100.00
1977–78	200.00

‡Increase by semester hour (graduate and part-time undergraduate students):

1975–76	4.00
1976–77	4.00
1977–78	7.00

The University Center Fee will be increased for the 1975 summer sessions and the academic year 1975-76. For students taking 11 or more semester hours, the fee will be $46.50 a semester, an increase of $3.50. Students taking less than 11 semester hours will pay $4.35 a semester hour, an increase of $.35.

Every effort will be made to keep tuition increases within the above limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment in these estimates.

* Payment of the continuous registration fee entitles the student who is granted leave of absence to return and continue his work toward a degree under the academic requirements which were in force at the time of his first registration. The continuous registration fee applies toward neither tuition fee nor residence requirements for the degree.
This fee does not apply to students granted military leave, see page 47.
† A student who drops a Chemistry course before the end of the semester must check out of the laboratory at the next laboratory period.
‡ Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made payable to George Washington University.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 23, 1974 (for the fall semester), and March 5, 1975 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made. The University will not obligate itself to notify the student, in advance, of the payment-due date for the second half of the semester charges.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $525 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his rights to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

PREPAID AND DEFERRED PAYMENT PLANS FOR PARENTS

Several commercial programs for parents who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the dean of the college, school, or division in which the student is registered. Notification to an instructor is not an acceptable notice (see "Withdrawal," page 45).

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

1. *Complete withdrawal from the University:*

FALL SEMESTER

Withdrawal dated on or before September 6, 1974	90 per cent
Withdrawal dated September 9 to September 20, 1974	75 per cent
Withdrawal dated September 23 to October 4, 1974	50 per cent
Withdrawal dated after October 4, 1974	none

SPRING SEMESTER

Withdrawal dated on or before January 17, 1975	90 per cent
Withdrawal dated January 20 to January 31, 1975	75 per cent
Withdrawal dated February 3 to February 14, 1975	50 per cent
Withdrawal dated after February 14, 1975	none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal by a part-time student*, the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in an undergraduate full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for complete withdrawal from the University (see No. 1 above). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 47).
5. Regulations governing student withdrawals as they relate to resident hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be reduced or refunded because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred and will not be credited to another semester (exception: students granted military leave, see page 47).

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

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* Regulations concerning withdrawal and refunds for the summer sessions are stated in the *Summer Sessions Catalogue*.

Financial Aid

FOR UNDERGRADUATE STUDENTS*

GEORGE WASHINGTON UNIVERSITY has, for undergraduate students, a program of financial assistance consisting of scholarships, loans, grants, part-time employment, or a combination of these resources. The University participates in the National Direct Student Loan, Supplemental Educational Opportunity Grant, and College Work-Study programs. Financial aid is awarded on the basis of the student's scholastic record, financial need, and qualities of leadership.

Applications and supporting credentials for financial aid must be filed by February 1 (entering freshmen), March 1 (enrolled undergraduate or entering transfer students) preceding the academic year of the award for the fall semester; by November 1, for the spring semester; and May 1, for the summer session†. A student must reapply for financial aid each year.

Complete information concerning financial assistance is contained in the pamphlet "Student Financial Aid," which is available at the Office of Student Financial Aid, George Washington University, Washington, D.C. 20006.

The following scholarships are available to students in Columbian College of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs. The University also offers other scholarships which are available to students in these colleges and schools as well as other schools.

The George Washington University Board of Trustees Scholarships.—Full- and partial-tuition scholarships, which begin in the fall semester and extend for four successive academic years, provided the holder maintains a *B* average, as well as a high standard of deportment, and continues to be in financial need. Candidates must plan to select a curriculum leading to a Bachelor's degree in any school of the University, except the College of General Studies. Students who have demonstrated outstanding ability in interscholastic speech and debate activities are eligible for the George F. Henigan Scholarships in Debate which are included among these scholarships.

OTHER SCHOLARSHIPS

Achievement Rewards for College Scientists (ARCS) Foundation, Inc., Scholarship
Sherman Page Allen Memorial Scholarship Fund (1966)
Alumni Scholarships
Mary J. Anderson Scholarship (1969)
Byron Andrews Scholarship (1920)
Henry N. Brawner, Jr., Foundation Scholarship Fund (1963)
Emma K. Carr Scholarships (1932)
Maria M. Carter Scholarship (1871)
Paul E. Casassa Memorial Foundation Scholarship (1968)
Chi Omega Alumnae Scholarship (1966)
Columbian Women Scholarship Funds
Victoria Briggs Scholarship Fund (1959)

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*For information concerning financial aid for students from foreign countries, see page 38.
†A Summer Sessions student is eligible for consideration only if he is enrolled in this University for at least 8 semester hours in the immediately preceding spring semester or has applied for financial aid for the following fall semester.

Elizabeth V. Brown Scholarship Fund (1925)
Grace Ross Chamberlin Scholarship Fund (1932)
College Women's Scholarship Fund (1926)
Columbian Women Members' Scholarship Fund (1961)
Arline Hughes Dufour Scholarship Fund (1961)
Dr. Watson W. Eldridge, Jr., and John F. Eldridge Scholarship Fund (1964)
Founders of Columbian Women Scholarship Fund (1920)
Rose Lees Hardy Foundation Scholarship Fund (1957)
Lillian Young Herron Scholarship Fund (1925)
Nellie Maynard Knapp Scholarship Fund (1915)
Marcia B. Kraft Scholarship Fund (1966)
Janet McWilliams Scholarship Fund (1954)
Marie-Louise Ralph Turner Scholarship Fund (1963)
D.C. Daughters of the American Revolution Scholarship (1952)
Isaac Davis Scholarship (1869)
District of Columbia Institute of Certified Public Accountants Scholarship in Accounting (1964)
Estella Constance Drane Scholarship (1957)
Louise Smith Engel Scholarship (1972)
Robert Farnham Scholarship (1871)
Federal Government Accountants Association—Washington, D.C., Chapter—Scholarship in Accounting
Esther Brigham Fisher Scholarship (1951)
Foreign Student Scholarships (see page 38)
General Motors College Scholarship (1955)
Mildred Green Memorial Scholarship Fund (1959)
Anna Spicker Hampel Scholarship (1949)
Julian O. Hargrove Scholarship (1968)
Elma Lewis Harvey Scholarship (1921)
Hazleton Scholarship (1950)
George F. Henigan Scholarships in Debate (1967)
David B. and James L. Karrick, Jr., Scholarship Fund (1968)
Samuel and Elizabeth Kay Scholarships 1969)
Amos Kendall Scholarship (1869)
L. Poe Leggette Memorial Scholarship Established by WRGW (1968)
Martha's Marathon Residence Hall Scholarship
Mitchell-Stancioff Scholarship (1967)
A. Morehouse Scholarship (1861)
E. K. Morris Education Fund Scholarships (1972)
Helen Marie and Thomas E. Orr Scholarships (1965)
Phi Delta Gamma Scholarships (1956)
Fred B. and Alma D. Pletcher Scholarship Fund (1968)
Levin M. Powell Scholarships (1886)
Research Assistantships in Operations Research and Related Fields (see page 35)
Resident Assistantships (see page 36)
Henry Whitefield Samson Scholarship Fund (1966)
Lula M. Shepard Scholarships (1946)
Sigma Delta Chi Foundation of Washington, D.C., Scholarships
Margaret Lucille Snoddy Scholarship (1970)
David Spencer Scholarship (1918)

Mary Lowell Stone Scholarship (1893)
Charles Clinton Swisher Scholarships (1941)
Tau Kappa Epsilon Scholarship (1959)
U.S. Office of Education Traineeships (1964)
University Players Scholarship in Memory of L. Poe Leggette (1968)
William Walker Scholarship (1824)
Abigail Ann Brown and Henry Kirk White Scholarship Fund (1963)
John Withington Scholarship (1830)
Women's Physical Education Alumnae Association Scholarship (1964)
William G. Woodford Scholarship (1969)
Ellen Woodhull Scholarship (1919)
Zonta Club Scholarship (1950)

GRANTS

The following funds have been established to meet the special needs of disadvantaged students from the District of Columbia Inner-City and the Washington metropolitan area.

George Washington University's Educational Opportunity Program Tuition Grants (1968)
Key Club of Walt Whitman High School, Bethesda, Md., Grant (1968)
Marriott Foundation Grant (1968)
Supplemental Educational Opportunity Grants

FOR GRADUATE STUDENTS*

The George Washington University program of financial assistance for graduate students includes assistantships, fellowships, traineeships, graduate scholarships, research appointments, part-time employment, and loans. Application for admission to graduate study is a prerequisite for consideration.

Application and correspondence concerning assistantships, fellowships, traineeships, or graduate scholarships should be sent directly to the dean of the school concerned, and addressed to George Washington University, Washington, D.C. 20006. Unless otherwise specified, application and supporting credentials should be submitted no later than February 1 preceding the academic year for which the award is made.

ASSISTANTSHIPS

Research Assistantships in Operations Research and Related Fields.—Available to graduate students, juniors, and seniors, in any college or school of the University. Research Assistants are expected to work 20 hours a week conducting research in support of an established research program, in programming or in conducting individual research on an approved research project. Stipends vary from approximately $3,300 to $6,800, depending on the status of the student and the tenure of the appointment (9-12 months). Applications must be received prior to March 1. Further information and applications are available from the Director, Institute for Management Science and Engineering, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

*For information concerning financial aid for students from foreign countries, see page 38.

Resident Assistantships (men and women).—Available to graduate studen and seniors in any field of study who are interested in working with the stude personnel program in University residence halls. Specific duties vary with t position, but basically consist of counseling, advising student groups, and a ministration. Remuneration includes full tuition and a furnished room for t academic year. All positions are part-time, and staff members are required enroll as full-time students in degree granting programs. Application should completed before March 1. Further information may be obtained from t Office of the Director of Housing.

Arlington County—George Washington University Cooperative Assistantsh Program
Health Care Administration Research Assistantships
National League of Cities/George Washington University Assistantship
Urban Affairs Assistantship

FELLOWSHIPS, INTERNSHIPS, TRAINEESHIPS, SPECIAL PROGRAMS

The following fellowships, internships, and traineeships are available to studen in the Graduate School of Arts and Sciences, the School of Education, t School of Government and Business Administration, and the School of Publ and International Affairs. The University also offers many other fellowshi which are available to students in these colleges and schools.

Graduate Teaching Fellowships.—Available to graduate students in Maste and doctoral programs in most departments of the University. Each teachi fellow renders a designated unit of service to his major department of instru tion and receives a stipend of up to $3,000 (on a 9-month basis), plus tuitio course fees, and University Center fee.

Research Traineeships.—Available under numerous sponsored programs in number of departments. Currently, the basic medical science departments a the departments of Psychology and Speech and Drama offer such program Stipends vary; information is available from the departments and the Office the Dean of the Graduate School of Arts and Sciences.

Achievement Rewards for College Scientists (ARCS) Foundation, Inc., Fello ship
Robert A. Aleshire Fellowship Fund (1971)
American Association of Collegiate Schools of Business Fellowship
American Civilization Fellowships
American Civilization Internships (Smithsonian Institution-George Washingt University Cooperative Program)
American Iron and Steel Institute Fellowship
Arthur Anderson & Co. Doctoral Fellowship
Winfield Scott Blaney Fellowship in International Affairs (1961)
Oliver T. Carr, Sr., Memorial Fellowship in Urban and Regional Planning (197
Thomas Alva Edison Fellowship
Elementary Teacher Education Internships
Ernst & Ernst Grant to Doctoral Candidates in Business or Economics
Foreign Student Fellowships (see page 38)
Health Care Administration Fellowships
Richard D. Irwin Doctoral Fellowships
Isabella Osborn King Research Fellowships (1927)

Loula D. Lasker Fellowships in Housing, City Planning, or Urban Renewal
Mellon Foundation Fellowships
Minorities in Planning and Related Professions Program
National Association of Purchasing Management Fellowship
National Historical Publications Commission-George Washington University Cooperative Research Fellowships
National Science Foundation Graduate Fellowships
Resources for the Future, Inc., Fellowship Prize
Rose Bibliography Internships
Thomas Bradford Sanders Fellowships (1928)
Scottish Rite Fellowships
U.S. Office of Education Fellowships (1964)
U.S. Public Health Service Traineeships
U.S. Public Health Service Traineeships in Comprehensive Health Planning
Urban Studies Fellowships of the Department of Housing and Urban Development
Urban Transportation Center Fellowship

GRADUATE SCHOLARSHIPS

Armed Forces Health Professions Scholarship Program (The Uniformed Services Health Professions Revitalization Act of 1972 (Public Law 92-426)
Emma K. Carr Scholarships (1932)
Paul H. and Margaret M. DeMaine Scholarships (1967)
District of Columbia Institute of Certified Public Accountants Scholarship in Accounting (1964)
Foster G. McGaw Scholarship in Health Care Administration (1971)
Mitchell-Stancioff Scholarship (1967)
Paul Pearson Scholarship Fund (1940)
Phi Delta Gamma Scholarship Fund (1968)
Voorhees Scholarships
Wolcott Foundation Scholarships

SPONSORED AWARDS FOR GRADUATE STUDY

Information regarding awards sponsored by foundations, professional and learned societies, industries, and others which may be used in support of graduate study is available at the Graduate Fellowship Information Center for students enrolled at George Washington University. Information is also available on the prestige programs such as the Rhodes, Marshall, Woodrow Wilson, Fulbright, Rotary International, and Danforth, as well as many others.

As deadlines for application vary, qualified students should make inquiries well in advance of the year of planned graduate study.

LOAN FUNDS

The following loan funds are available to undergraduate and/or graduate students in Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs. A separate

application must be submitted for all loan programs. Applications for National Direct Student Loan should be filed no later than April 1 for spring semester. Complete information is contained in the pamphlet "Stud Financial Aid," which is available in the Office of Student Financial A George Washington University, Washington, D.C. 20006.

American Medical Association Nursing Home Administration Loan Fund
Foreign Student Loan Fund (1967)
W. K. Kellogg Foundation Hospital Administration Loan Fund
Jessie B. Martin Loan Fund (1967)
National Direct Student Loan Program
Ellis H. Stearman Emergency Loan Fund
Hiram Miller Stout Memorial Loan Fund (1973)
U. S. Loan Program for Cuban Students
University Student Emergency Loan Fund

STUDENT EMPLOYMENT

The University participates in the College Work-Study Program. Inquir should be addressed to the Office of Student Financial Aid. In addition, t Student and Alumni Career Services Office maintains a registry of both full-tir and part-time positions available in the Washington area for undergradua and graduate students.

After registration, students may apply at the Student and Alumni Care Services Office, Woodhull House, 2033 G Street, N.W., for interviews and r ferrals to positions for which they are qualified.

FOREIGN STUDENTS

Undergraduate foreign students with proven financial need who have complet one semester of full-time work (15 hours) at this University with a *B* avera are eligible to apply for the Board of Trustees Scholarships. Scholarships a awarded in the spring for the following academic year. See instructions f applying for undergraduate financial aid, page 33.

Limited awards for graduate teaching fellowships are the responsibility of t chairman of the department or dean of the school in which the degree is to earned. Work as a teaching fellow requires excellent knowledge of English both spoken and written.

Long-term loan funds for undergraduate and graduate foreign students a limited in amount and are available only to those foreign-born persons who ha established resident status in the United States through the Immigration a Naturalization Service.

We suggest that students who wish to study in the United States have ava able sufficient funds to cover expenses for one full year before attempting enter a college or university. The cost at this University for one academic y (September-May) is approximately $5,000. This estimate includes room a board, tuition, books, clothes, and incidental expenses; no travel, holiday, medical expenses are included.

LAW ENFORCEMENT EDUCATION PROGRAM

This program of grants and loans, authorized under the provisions of the Omnibus Crime Control and Safe Streets Act of 1968, is intended to help pay the cost of educational expenses of officers who are employed by publicly funded law enforcement or correctional agencies. Studies may be full- or part-time in a wide range of subject areas and degree goals. Priority will be given to officers on the state and local levels, and to veterans of the Armed Forces of the United States. Applications and further information are available from the LEEP Coordinator, Department of Forensic Sciences.

Prizes

Accounting Prizes.—Three prizes awarded annually by the Department of Accounting—one each to the undergraduate Accounting major with the highest scholastic standing, to the candidate for the degree of Master of Business Administration with the highest scholastic standing in the Accounting concentration, and to the Doctoral candidate with a field in Accounting who has the highest scholastic standing at the completion of the General Examination.

Alpha Chi Sigma Prize.—Awarded annually by the Alpha Pi Chapter to the student who has attained the highest academic record in courses in chemistry. The name and year of graduation of the student is inscribed on a bronze plaque. The winner must have had at least 16 hours in chemistry, including the final semester at this University.

Alpha Kappa Psi Prize.—A key, awarded annually by Beta Mu Chapter to the male student who has completed 90 semester hours at this University and attained the highest average grade in business administration, economics, international business, public accounting, and public finance. The name of the winner and the year of the award are engraved on a plaque in the Office of the Dean of the School of Government and Business Administration.

American Institute of Chemists Prize.—A medal awarded annually to the graduating student majoring in chemistry who excels in scholarship, integrity, and leadership.

Department of Art Prizes.—Two prizes—one for an undergraduate majoring in Art History and one for an undergraduate majoring in Fine Arts—awarded annually to the most promising students, as determined by the departmental faculty.

The Walter G. Bryte, Jr., Achievement Award.—Provided by Walter G. Bryte, Jr., Colonel, U.S. Air Force (retired), first Professor of Air Science at George Washington University. The award is presented annually primarily to that undergraduate residence hall, secondarily to any other activity at the University, which has shown under the leadership of its elected or designated head, the most improvement or excellence in its support of the principles and aims of the United States of America and George Washington University. The hall or other activity will be awarded a cash prize, and the name of its leader and the hall or activity will be engraved on a silver trophy.

Byrne Thurtell Burns Memorial Prize.—Awarded to the senior majoring in chemistry who shows the greatest proficiency in organic chemistry, as evidenced

by a comprehensive examination, and who possesses such qualifications of min character, and personality as to give promise of future achievement.

Business Administration Prize.—Awarded annually by the Department Business Administration to the outstanding graduating senior in the accountir or business administraton degree program on the basis of scholarship, leade ship, and service to the University.

Wilbur J. Carr Prize.—Established in 1962 by Edith K. Carr, former Tru tee of the University, in memory of her distinguished husband, who was gradu ated from the School of Comparative Jurisprudence and Diplomacy in 189 It is awarded annually to that man in the graduating class of the Universit who has demonstrated outstanding ability in his study of international affai and who has given evidence of possessing in marked degree the qualities whic produce the good citizen and the dedicated public servant.

The Chemical Rubber Co. Freshman Chemistry Achievement Prize.— *Handbook of Chemistry and Physics* awarded annually to the freshman studer who has demonstrated the greatest achievement in Chemistry 15-16.

The Columbian Women Prize.—Awarded to the senior woman who in h undergraduate life has most nearly fulfilled the objectives of Columbian Wome

John Henry Cowles Prizes.—Two prizes, established by John H. Cowle Grand Commander of the Supreme Council of Thirty-third Degree (Moth Council of the World) of the Ancient and Accepted Scottish Rite of Fre masonry, Southern Jurisdiction of the United States of America. Awarde annually to the senior in the School of Government and Business Administr tion and to the senior in the School of Public and International Affairs with th highest academic averages.

DeWitt Clinton Croissant Prize.—Awarded annually to the undergradua student enrolled in a course in drama or active in University dramatics wh submits to the English Department the best essay on drama or the theatre.

E.K. Cutter Prize.—Established by Marion Kendall Cutter "for excellen in the study of English." Awarded to the member of the graduating class whos record in English, combined with general excellence, shows most marked apt tude for and attainment in English studies.

Isaac Davis Prizes.—Established in 1847 and awarded annually to the thre seniors who have made the greatest progress in public speaking while enrolle in the University. Awards are to be determined by a public-speaking conte in which the participants deliver original orations. Only members of the senio class of Columbian College of Arts and Sciences who are candidates for th degree of Bachelor of Arts or Bachelor of Science are eligible to compete.

Henry Grattan Doyle Memorial Prize.—Established in memory of Henr Grattan Doyle, a former Dean of Columbian College. Awarded annually t an outstanding senior for excellence in Spanish.

Elton Prize.—Established by the Reverend Romeo Elton, of Exeter, Eng land, and awarded annually to the student with the highest average in the mo advanced course in the Greek language and literature.

Jesse Frederick Essary Prize in Journalism.—Established by Helen Essar Murphy and awarded annually to a student who has given promise of soun citizenship and who submits the best printed and published evidence of abilit in "forthright reporting" and good journalistic writing, in a student publicatio or elsewhere.

Joshua Evans III Prize in Political and Social Sciences.—A memorial priz "established by friends because of an outstanding life." Awarded annually t

hat man in the graduating class "who has demonstrated his signal ability in he social and political sciences and who has given promise of the interpretaon of that ability in good citizenship among his fellows."

Willie E. Fitch Prize.—Established by James E. Fitch in memory of his son. warded annually to a senior student for the best examination in chemistry.

Alice Douglas Goddard Prize.—A memorial established by Frederick Joseph oddard, of Georgetown, D.C. Awarded annually to the senior student making he highest average in American literature.

Edward Carrington Goddard Prize.—Established by Mary Williamson Godard, Alice Douglas Goddard, and Frederick Joseph Goddard, of Georgetown, .C., in memory of Edward Carrington Goddard, class of 1881. Awarded to he junior or senior student making the highest average in the French language nd literature.

Morgan Richardson Goddard Prize.—A memorial established by Mary Wilamson Goddard, Alice Douglas Goddard, and Frederick Joseph Goddard, of eorgetown, D.C. Awarded to the junior or senior student making the highest verage in the following fields: business administration, economics, internaonal business, or public accounting.

Gardiner G. Hubbard Memorial Prize in United States History.—Established y Gertrude M. Hubbard in memory of her husband and awarded annually to hat member of the graduating class majoring in history who has maintained he highest standing in courses in United States history.

International Business Prize.—Two prizes awarded annually by the School f Government and Business Administration to students specializing in interational business, one awarded to a graduating senior and one awarded to a raduate student.

Kappa Kappa Gamma Prize.—Awarded annually to a full-time freshman or phomore student for excellence in Biological Sciences 12.

David Lloyd Kreeger Prizes in Art.—Five prizes given by Mr. Kreeger, three the fine arts and two in art history (including museology). Fine arts prizes e awarded to a senior or graduate student in painting, sculpture, and graphics design. One prize in art history is awarded to a senior and one to a graduate udent. Candidates for the prizes must submit original papers or works of art. inners are selected by distingiushed representatives of the field of art in the ashington, D.C., area.

Minna Mirin Kullback Memorial Prize.—Established in 1968 by Solomon ullback in memory of his wife. Awarded annually by a committee of faculty embers of the Department of Statistics to a full-time undergraduate or gradue student majoring in statistics, who will have completed 18 semester hours of atistics courses by the end of the spring semester.

John Francis Latimer Prize in Classics.—Established in 1973. Awarded to a aduating senior who has made the most outstanding record as a major in e Department of Classics.

Hilda Haves Manchester Prize in Sociology.—Established in honor of Hilda aves Manchester, B.A. 1932, an outstanding student whose major field was ciology. Awarded annually by Columbian College of Arts and Sciences to senior woman student majoring in sociology who has the highest scholastic cord.

Vivian Nellis Memorial Prize.—Awarded to a student in the English Departent who has shown special promise in the field of creative writing.

Phi Delta Kappa Prize.—Awarded annually by Beta Gamma Chapter to the

outstanding senior man in the teacher education program in the School of cation.

Phi Eta Sigma Prize.—A choice book selected from the field of the re ent's major, awarded annually by the George Washington University Cha to the male student attaining the highest scholastic average in his first semester of work. The winner's name is engraved on a plaque in the Offic the Dean of Columbian College of Arts and Sciences.

Pi Lambda Theta Prize.—Awarded annually by Alpha Theta Chapter to outstanding senior woman in the teacher education program in the Schoo Education.

Psi Chi Prizes.—Two prizes awarded annually by the George Washin University Chapter to the best undergraduate student in experimental chology and to the M.A. degree candidate or second-year graduate student mitting the best thesis or research project in psychology.

Ruggles Prize.—Established by Professor William Ruggles in 1859, awar annually to a candidate for a Bachelor's degree for excellence in mathema

Hermann and Johanna Richter Schoenfeld Prize.—Established in grat appreciation of the inspired teaching and devotion to his students of Dr. H mann Schoenfeld, who for more than 20 years until his death in 1926 hea the Department of German. Hermann Schoenfeld, Ph.D., LL.D., was wid recognized as a scholar of distinction whose presence on the faculty ad prestige to the University. This prize is given annually to a member of graduating class for excellence in historical and cultural phases of Gern studies.

Society of Colonial Wars in the District of Columbia Prize.—A gold me awarded to a candidate for a graduate degree who, in the judgment of the f ulty of the Department of History, submits a thesis or dissertation demonstr ing excellence in historical research in American Colonial history. The Univ sity reserves the right to withhold the award if no thesis or dissertation atta ing the required degree of excellence is submitted.

Staughton Prize.—Established by the Reverend Romeo Elton and award annually to the student making the best record in the most advanced courses the Latin language and literature.

James MacBride Sterrett, Jr., Prize.—Established in 1911 by Professor St rett in memory of his son. Awarded annually to the student who obtains t highest average in Physics 1 and 2.

Charles Clinton Swisher Historical Club Prize.—Established in 1936 by t Charles Clinton Swisher Historical Club and augmented in 1941 by the bequ of Professor Swisher. Awarded annually to the student who submits the b essay covering some phase of medieval history.

James H. Taylor Graduate Mathematics Prize.—Established in memory James H. Taylor, former Professor of Mathematics at the University. Award annually to a graduate student for outstanding performance in mathemat

Benjamin D. Van Evera Memorial Prize.—Awarded annually to that Grad ate Teaching Fellow in Chemistry selected as the most effective teacher dur the current academic year.

The Wall Street Journal Leadership Prize.—Awarded annually to a gradu ing senior in the Bachelor of Business Administration degree program f outstanding leadership and service to the University.

Thomas F. Walsh Prize.—Established in 1901 and awarded annually to t student who submits the best essay in Irish history.

Alexander Wilbourne Weddell Prize.—Established in 1923 by Virginia Chase Weddell in memory of her husband. Awarded annually to a candidate for a degree who writes the best essay on the subject of "the promotion of peace among the nations of the world." The prize essays shall become the property of the University and shall not be printed or published without the written consent of the University. The University reserves the right to withhold the award if no essay attaining the required degree of excellence is submitted.

Regulations

A STUDENT ENROLLED in the University is required to conform to the following regulations and to comply with the rules and regulations of the college, school, or division in which he is registered.

A student who withdraws or is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue his work only under the rules and regulations in force at the time of his return.

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, his registration may be cancelled. If such falsification is discovered after the student has established an academic record at the University, he may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Faculty) for subsequent registration in the University.

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered. Regular attendance is expected. A student may be dropped from any course for undue absence.

SCHOLARSHIP REQUIREMENTS

A student who fails to maintain the scholarship requirements of the college, school, or division in which he is registered may be dismissed from the University.

GRADES

Grades are mailed to the student through the Office of the Registrar at the close of each semester. They are not given out by instructors.

UNDERGRADUATE

The following grading system is used: *A*. Excellent; *B*. Good; *C*. Satisfactory; *D*. Low Pass; *F*. Fail; *I*. Incomplete; *W*. Authorized Withdrawal; *CR*. Credit; *NC*. No Credit. Except for courses which specifically state that repetition for credit is permitted, a candidate for a degree at this University may not repeat for credit a course in which he has received a grade of *D* or better, unless re-

quired to do so by the department concerned. A written statement to th effect must be submitted to the Registrar by the appropriate department chai man.

GRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Minimu Pass; *F*, Fail; *I*, Incomplete; *CR*, Credit; *W*, Authorized Withdrawal. Excep for courses which specifically state that repetition for credit is permitted, candidate for a degree at this University may not repeat for credit a course which he has received a grade of *C* or above, unless required to do so by th department concerned. A written statement to this effect must be submitted the Registrar by the appropriate departmental chairman. In the Gradua School of Arts and Sciences this regulation is slightly different (see page 91).

INCOMPLETE/AUTHORIZED WITHDRAWAL

Whenever a grade has not been assigned, the symbol *I* (Incomplete) or th symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicate that a satisfactory explanation has been given the instructor for the student failure to complete the required work of the course. At the option of the in structor, the grade of *I* may be recorded if a student, for reasons beyond h control, is unable to complete the work of the course, and if the instructor informed of, and approves, such reasons before the date when grades must b reported. The grade may be used only if the student's prior performance an class attendance in the course have been satisfactory. Any failure to comple the work of a course which is not satisfactorily explained to the instructo before the date when grades must be turned in will be graded *F*. If acceptabl reasons are later presented to the instructor, he may initiate an appropriat grade change.

REMOVING AN INCOMPLETE

For information concerning the removal of a grade of Incomplete from a stu dent's record, consult the regulations of the college, school, or division con cerned.

THE QUALITY-POINT INDEX*

Scholarship is computed in terms of the quality-point index, obtained by divid ing the number of quality points by the number of semester hours for whic the student has registered, both based on his record in this University. Quality points are computed from grades as follows: *A*, four points; *B*, three points *C*, two points; *D*, one point; *F*, no points, for each semester hour for whic the student has registered. Courses marked *W*, *I*, *NC*, or *CR* are not con sidered in determining the index, except that courses marked *I* will be con sidered when a formal grade is recorded. Grades in courses taken at anothe institution are not considered in computing the quality-point index.

* Applicable only to the Graduate School of Arts and Sciences, the School of Education, the Schoo of Government and Business Administration, and the *graduate programs* in the School of Public an International Affairs.

FINAL EXAMINATIONS

Final examinations for undergraduate courses are scheduled at the end of each semester by the Office of the Registrar. Examinations for courses numbered 201 or above are scheduled, if desired, by the individual department or instructor.

ACADEMIC DISHONESTY

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the appropriate dean's council, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the appropriate dean's council, the disciplinary grade of "Failure—Academic Dishonesty" will be recorded for the course involved, and this grade will be employed in the computation of the quality-point index or academic standing. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

WITHDRAWAL

Withdrawal from a course or from the University requires the permission of the dean of the college, school, or division in which the student is registered. Permission to withdraw from the University will not be granted a student who does not have a clear financial record (see page 32).

Each college, school, and division of the University sets deadline dates for each semester concerning withdrawal. Withdrawal between these dates and the end of the semester is permitted only in exceptional circumstances.

All charges for courses dropped without the approval of the dean must be met by the student. Reporting the dropping of a course to an instructor does not effect its discontinuance.

CHANGES IN PROGRAM OF STUDY

Changes within a College, School, or Division.—A student may not substitute one course for another, drop courses (see "Withdrawal," above), change his status from credit to audit or audit to credit without the approval of the dean of the college, school, or division in which he is registered.

Change from one section to another of the same course may be made with the approval of the dean and the department concerned.

Change from one major subject to another within the same college or school may be made with the approval of the dean. All requirements of the course of study to which the change is made must be met.

Transfer within the University.—Application for transfer to another college, school, or division must be made to the appropriate admitting office on the form provided by the deans concerned. Transfer from the appropriate preprofessional curriculum in Columbian College to Bachelor's degree candidacy in the School of Education or the School of Public and International Affairs is automatic on completion of 60 or more semester hours of course work.

A maximum of 45 semester hours earned in the Division of University Students may be applied toward a Bachelor's degree in a degree-granting college or school of the University. Work done in the Division of University Students

will not be counted toward a graduate degree unless prior written approva obtained from the relevant degree-granting college or school, has been filed i the Office of the Dean of the Division of University Students (see page 181

Students transferring within the University are advised to study carefully th graduation requirements on pages 47-48 and to note that, unless otherwi specified, in all undergraduate divisions, 30 semester hours, including at lea *12 semester hours* in the major field, must be completed while registered the school or college from which the degree is sought. Upon transfer th student should consult the dean concerned and understand clearly the requir ments he must fulfill.

CREDIT

Credit is given only after registration for a course and satisfactory completio of the required work, or upon the assignment of advanced standing in accor ance with the regulations of the several colleges, schools, and divisions.

Auditing.—A person who has been admitted to the University may registered, with the permission of the instructor, as an "auditor" in a class (n academic credit). An auditor is not required to take active part or to pa examinations. A student who takes a course as an auditor may not repeat later for credit.

SUMMER SCHOOL CREDIT

A student who plans to attend summer school at another institution and app credit so earned toward graduation from this University must first secure th written approval of his dean. In no event will credit in excess of what mig be earned in a similar period in this University be recognized.

BALANCE SHEET

On request, the Registrar will issue to undergraduate degree candidates a ba ance sheet showing the amount of work completed and the requirements r maining to be met for the degree. A second balance sheet is issued only if th student changes major or degree objectives.

TRANSCRIPTS OF RECORD

Official transcripts of student records are issued on request of the student former student who has a clear financial record. A fee of two dollars is charg for each transcript.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* d gree requirements are satisfied. Students who have completed course registr tion (including the thesis) must maintain continuous registration by paying th "continuous registration" fee (see page 30). By failing to register for o semester or more, the student breaks his registration and must be readmitte (see "Readmission," page 25). A "Readmitted Student" is required to satis the curriculum requirements existing at the time of his readmission.

Students must be registered during the summer if they are taking cours

re taking required examinations, are receiving guidance on theses or dis-ertations, or are expecting to graduate at the end of the summer Sessions.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of ctive duty, upon presentation to his dean of a copy of his orders and a peti-ion for such leave. The maintenance of "continuous registration" is not re-uired of the student on military leave; however, he must apply for readmis-ion to the University well in advance of the semester in which he expects to eturn. Payments for tuition and fees which are not refunded to the student at he time he is granted military leave will be maintained as a deferred credit for is account and use upon his return to the University.

RADUATION REQUIREMENTS

Degrees are conferred in February, May, and September.

To be recommended by the Faculty for graduation a student must have met he admission requirements of the college or school in which he is registered; ompleted satisfactorily the scholarship, curriculum, residence, and other re-uirements for the degree for which he is registered; and be free from all in-ebtedness to the University. Registration, either for course work or on the continuous registration" fee basis, is required for the semester or summer ses-on immediately preceding the awarding of a degree.

Application for Graduation.—An "Application for Graduation" form *must* e filed and the appropriate fee paid at the time of registration for the last se-ester or summer session of the senior or final year. Students completing de-ee requirements during the Summer Sessions will be awarded diplomas (no rmal convocation) September 30, *provided* they have completed all degree quirements and have applied for graduation as a part of registration for the mmer Sessions.

Scholarship.—The student must meet the scholarship requirements for the rticular degree for which he is registered.

Curriculum.—Minimum curriculum requirements for each degree are stated der the college or school offering work in preparation for the degree.

Residence.—Unless otherwise specified, in all undergraduate divisions of the niversity, *a minimum of 30 semester hours, including at least 12 hours in the ajor field, must be completed while registered in the school or college from hich the degree is sought.* This requirement applies to students transferring thin the University as well as to students transferring from other institutions. nless special permission is granted by the dean of the college or school con-rned to pursue work elsewhere, the work of the senior or final year must be mpleted in the college or school from which the degree is sought.

The graduate student must meet the residence requirements for the particular gree for which he is registered.

National Teacher Examinations.—All candidates for the degree of Bachelor Arts in Education are required to take the National Teacher Examinations.

Attendance and Conduct.—The University reserves the right to refuse to nfer a degree upon a candidate whose attendance or conduct has been un-isfactory.

Thesis or Dissertation.—A thesis or dissertation submitted in partial satisfac-

tion of requirements for a degree must be presented in its final form to dean of the college or school concerned no later than the date specified in University Calendar.

Accepted theses and dissertations, with accompanying drawings, become property of the University and are deposited in the University Library, wh the duplicate copies are bound and made available for circulation. See appropriate college or school in this catalogue for regulations governing the and dissertations.

HONORS

WITH DISTINCTION

In all undergraduate divisions of the University the degree may be confer "With Distinction," at the discretion of the faculty, if a student meets the sp cific requirements of his college or school, as follows:

1. Columbian College of Arts and Sciences or School of Public and Int national Affairs—the attainment of the grades of *A* in 60 per cent of courses taken at this institution; or
2. School of Education or School of Government and Business Administ tion—the attainment of a quality-point index of 3.50 or higher in all cou work taken at this institution.

To be eligible a student must have completed at this institution at least o half of the courses required for the degree.

SPECIAL HONORS

Special Honors may be awarded by the faculty to any member of the gradu ing class for outstanding achievement in the student's major field on reco mendation of the major department. The student must fulfill all of the follo ing requirements:

1. He must have his candidacy for Special Honors approved by the facu member representing the major department or field not later than the beg ning of the senior year.
2. He must meet such other conditions as may be set at the time his c didacy is approved.
3. He must have completed at this institution at least one-half of the cou required for the degree.
4. He must fulfill the specific requirement of the college or school in wh he is registered, as follows: (a) Columbian College of Arts and Sciences the School of Public and International Affairs—attainment of the grades *A* or *B* in 50 per cent of the courses taken at this institution; or (b) School of Education or the School of Government and Business Administ tion—maintain a quality-point index of at least 3.00 on all course work ta at this institution.

DEPARTMENTAL HONORS

The Department of History offers Departmental Honors if students meet spec requirements. For details, see the Department of History.

THE LIBRARY

All students registered in the University have the privilege of using the University Library. Its stacks are open, and all students are welcome to browse at their leisure. The current Registration Card must be presented when books are borrowed for outside use.

The loan period for stack books is 14 days. A fine of 25 cents is charged for each day a book is overdue. Any book which circulates is subject to recall by the Library if needed for reserve or other use. Reserve books must be used in the reserve reading room when the Library is open, except that they may be withdrawn for overnight use beginning at 8:30 p.m. A fine of 50 cents is charged for each hour or fraction thereof that a reserve book is overdue. Grades of a student are withheld until his library record is clear.

All students using the University Library are expected to be familiar with its detailed regulations, available on application to any of the Library's service desks.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; dates of attendance; verification of date and place of birth; degrees earned (if any), date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the stu-

dent whose record is being subpoenaed will be notified and the subpoena w be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to st dent files and records. If expressly requested, properly identified represent tives from federal, state, or local government agencies may be given the infc mation listed under No. 1 on page 49.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "Lo and Found" Office is maintained on campus in the Safety and Security Offic

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 517-19) contains regulations recently approved by th University's Board of Trustees.

Consortium of Universities of the Washington Metropolitan Area, Inc.

THE UNIVERSITIES in Washington, D.C.—American University, Catholic Un versity of America, *George Washington University*, Georgetown University and Howard University—are associated in a Consortium through which the coordinate the use of their respective facilities; District of Columbia Teache College, Gallaudet College, and Trinity College are associate members of th Consortium. Students in approved programs leading to degrees in any one o these institutions have the opportunity to select from the combined offerings o all the particular courses which best meet their needs.

Participation is limited to campus degree candidates. The following, how ever, are excluded: students in Canon Law, Dentistry, Medicine, and Theology Law students are also excluded from participation, except for candidates fo the degree of Master of Laws at George Washington University and Georg town University.

In special courses involving private instruction (such as music or art) o tutorial study, if a special fee is charged, this fee is not covered by the Con sortium agreement and must be paid by the individual student to the institutio administering the course. A student interested in registering for Reserve Office Training Corps (ROTC) courses should consult the Registrar at his institution

Students are encouraged to study the announcements of programs of all th participating institutions. See pages 27-28 for information concerning registra tion for Consortium courses. *A student may not take courses at another insti tution that are available at his own.*

Registration forms and instructions are available from the registrar of th institution in which the student is enrolled. The student registers and pays at hi own institution for all Consortium courses.

The Speech and Hearing Clinic

Director of Speech Pathology and Audiology J.W. Hillis

THE SPEECH AND HEARING CLINIC offers diagnostic and remedial work for children and adults with such communication difficulties as stuttering, lisping, cleft-palate speech, and cerebral-palsied speech; and with voice, articulatory, and hearing problems. Diagnostic and remedial work is also available for persons with nonstandard language usage due to such conditions as hearing loss, brain damage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $24. Fees for additional specialized testing are dependent on the testing involved. The fees for individual speech or hearing therapy range from $3 to $12 a session. Fees are reduced for full-time students enrolled in the University and for persons receiving group therapy. Fees are payable at the Office of the Cashier.

The Reading Center

Acting Director Florence E. Hesser

THE READING CENTER offers individual diagnostic and corrective services for all levels: primary, elementary, secondary, and adult. In addition, special reading improvement classes are conducted for high school and college students as well as other adults.

A complete diagnosis includes psychological tests; vision, hearing, dominance, and spelling tests; and various types of reading achievement and aptitude tests. Results are interpreted, and a written report is presented in conference with the parents or the individual.

The special reading improvement classes for high school students, college students, and other adults are offered throughout the year at stated intervals. Emphasis is placed on improvement of vocabulary, speed, comprehension, and study skills. Instruction in spelling is also provided as needed. Mechanical aids such as the tachistoscope, rate accelerator, and controlled reader are available for increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $90; for individual instruction, $10 a lesson; for semi-individual instruction, $7 a lesson; for instruction in small groups, secondary level, $6 a lesson. Reading classes (15 two-hour sessions) are offered for adults, $140; for full-time George Washington University students and faculty, $65. All fees are payable in advance at the Office of the Cashier.

Veterans Education

THE OFFICE OF THE REGISTRAR, Luther Rice Hall, 2121 Eye Street, N.W., assists students entitled to educational benefits as veterans or war orphans with any problems which may arise concerning their benefits. This Office also proc-

esses certification of enrollment and attendance to the Veterans Administrat so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans sho consult the Office of the Registrar prior to submitting application to the Vet ans Administration. All such students should obtain the instruction sheet issu by the Office of the Registrar, which sets forth requirements to be fulfill before certification of enrollment can be made to the Veterans Administrati and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D 20421.

University Computer Center

Director R.E. Thomas

THE UNIVERSITY COMPUTER CENTER is located on the first floor of Stuart H 2013 G Street, N.W. The facilities of the Center are available for acadeı purposes to all registered students and to members of the instructional sta The Center has as its principal mission the provision of a powerful computi system which serves the University in its educational, research, and administr tive endeavors. The Center's programming staff concentrates its efforts in co ducting faculty and staff seminars, consulting with users in the design a preparation of complicated programs, and carrying out computer-oriented search.

The Computer Center equipment consists of an IBM system 370 Model 1 computer with large capacity on-line disk storage, a card read/punch, a hig speed line printer, and four tape drives. The principal languages available to user are FORTRAN IV, COBOL, Programming Language One (PL/I), A sembler Language, and ALGOL. In addition, numerous utility, statistical, da manipulation, and simulation systems and special languages are available in t library of progarms. Facilities are available on a first-come, first-served basis preparation of programs and data.

Computer programming courses are offered by the School of Governme and Business Administration, the Department of Statistics, and the School Engineering and Applied Science. In addition, many other departments of courses that utilize the computer as a research adjunct to course work.

The Computer Center is normally open 24 hours a day, seven days a week

Continuing Education for Women

CONTINUING EDUCATION FOR WOMEN, Suite 621, University Library, offers i dividual and group counseling services as well as credit and noncredit cours and training programs. Brochures are available.

General Alumni Association

THE OBJECTIVES OF THIS ASSOCIATION are to unite the graduates who wish to ssociate themselves for charitable, educational, literary, and scientific pur-oses, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the Uni-ersity and who have left the University in good standing, or any person who or has been a member of the teaching, research, or administrative staff of the Jniversity, or of the Board of Trustees of the University. Active members are hose who are life members of the George Washington University General Alumni Association or the Alumni Association of any school of the University, r are current contributors to the George Washington University Fund.

All alumni are urged to keep the Alumni Office informed of changes of ad-lress or occupation and to supply information with regard to their fellow lumni. The Office is located in Alumni House, 714 21st Street, N.W., George Vashington University, Washington, D.C. 20006.

STUDENT LIFE

Vice President for Student Affairs William P. Smith, Jr.
Assistant to the Vice President for Student Affairs Mark Rosenberg
Director of the Cloyd Heck Marvin Center Boris Bell
Dean of Students Marianne Phelps

THE OFFICE OF THE VICE PRESIDENT FOR STUDENT AFFAIRS develops stude life programs, policies, and procedures to complement the University's form instruction program. These activities are implemented through the offices the Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Educ tional Opportunity Program, Housing, International Students, Student Activiti Student and Alumni Career Services, and Student Health Service.

STUDENT SERVICES

OFFICE OF THE DEAN OF STUDENTS

Dean of Students Marianne Phelps
Assistant Dean of Students Barbara Lembcke

The Office of the Dean of Students provides counseling and information to t general student body and assists in program development on campus, partic larly in the residence halls. The members of the staff of the Dean of Stude Office are informed on University policies and student services provided campus, enabling them to provide referrals and answers to many questions co cerning general student life. Personal letters of recommendation for stude applying to graduate and professional schools can also be obtained from t Dean of Students Office. The Dean of Students works with the Adviser International Students, the Director of the Counseling Center, the Director the Educational Opportunity Program, and the Director of Housing in implementation of their programs.

HOUSING

Director of Housing Ann Webster
Assistant Directors of Housing John Bohen, Gail Hanson, David Longaneck

Complete information concerning the University's residence halls is availab from the Director of Housing, George Washington University, Washingto D.C. 20006. Information concerning off-campus housing near the Univers may be obtained at this Office. The reservation of rooms in private houses m be made by students.

Admission to the University does not include a room reservation. The student will receive, with his notification of acceptance, University residence hall information, an application for residence hall space, and a declaration of intent to attend the University. The application for residence hall space must be accompanied by a $100 *nonrefundable deposit*. The housing deposit is credited toward the first semester's room charge. Rooms are leased for the academic year, and lease payment must be made by July 15 for the fall semester.

1974-75 RESIDENCE HALL RATES PER PERSON FOR TWO SEMESTERS*

For Men:	
Calhoun Hall	
double room	$875
triple room	825
For Women:	
Strong Hall	
single room	925
double room	875
For Men and Women:	
Crawford Hall (limited to sophomores, juniors, and seniors)—double room	825
Mitchell Hall (limited to sophomores, juniors, and seniors)—single room	925
Thurston Hall	
double room, triple room, large room for four	875
suite for six	825
Graduate Men and Women Only:	
Graduate Hall—apartment for two and three	925
Madison Hall—double room	875

FOOD SERVICE

Resident freshmen and sophomores are required to participate in the food service plan. Freshmen must participate in the seven-day, 20 meals per week plan, at the rate of $720* for the academic year. Sophomores may elect either the 20-meal plan or a five-day meal plan, 15 meals Monday through Friday, for $690* for the academic year. Each plan is optional for junior, senior, and graduate students. Food service payment does not cover University intersession or vacation periods. All meal cards admit bearer to the dining room in Thurston Hall and the second floor contract dining room in the Cloyd Heck Marvin Center.

MUNSON HALL APARTMENTS

Munson Hall is a University-owned and operated apartment house containing 15 one-bedroom and 54 efficiency apartments. Graduate and married students are given priority for residency until July 15 each year. Seniors and juniors who have lived at least one year in University residence halls will be considered for residency after that date if space is available. All leases are for 12 months.

* Residence hall and food service prices subject to change.

EDUCATIONAL OPPORTUNITY PROGRAM

Director Abla Yvonne Thomas
Counselor Ronald Whitmore

The Educational Opportunity Program is designed to offer a college educati primarily to black and other minority students who are graduates of Distr of Columbia high schools and/or other qualified District residents. It provid an opportunity for a student to seek a degree in almost any field and at t same time receive academic and/or financial assistance.

CLOYD HECK MARVIN CENTER

Director Boris Bell
Assistant Director Donald Cotter
Financial Officer Arthur Gilmore

The Cloyd Heck Marvin Center serves as the campus community center, pr viding services, conveniences, and recreational and social opportunities f students, faculty, staff, alumni, and guests. Its wide range of facilities provid the setting for a variety of porgrams conducted by the University Progra Board; the departments of Drama, Dance, and Music; and other student a faculty organizations.

The Center Governing Board, representative of all elements of the Universi community, plays an important role in the day-to-day functioning of the Cente This Board works closely with the full-time staff in the development of pr cedures and policies which provide a framework for the Center's operation.

STUDENT HEALTH SERVICE

Director Sal Fiscina, M.D.

The Student Health Service is an outpatient clinic designed to assist studen registered on campus with their health needs. This Service is located at 935 22n Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the academic year from 9 a.m. to 5 p.m. an from 6 p.m. to 10 p.m., Monday through Friday, and from 9 a.m. to 12 noo on Saturday. This schedule is also maintained during the Summer Session except that the evening closing hour Monday through Friday is 9 p.m.

For serious emergencies occurring during hours when the Student Healt Service is closed, students may go to the Emergency Room of the Universit Hospital for treatment. This arrangement is for emergency care only, and a fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receiv treatment at the Student Health Service. A student who is not currently en rolled or who has severed his connection with the University is ineligible fo medical benefits of the Student Health Service. Any student may engage, if h so desires, physicians and nurses of his own choice, but he will be responsibl for all the fees charged. The bills incurred from all services rendered outside th the Student Health Service (for example, X-ray work and referrals to spe

lists or other outside physicians) are the responsibility of the student. thin the Student Health Service, there will be only a few small charges for ne services, such as materials for an allergy injection series, overseas im- nizations, and certain other services.

Any student who intends to train for an athletic team is required to pass a rough medical examination. The University is not responsible for injuries eived in intercollegiate or intramural games, or in any of the activities of Department of Physical Education, Health, and Recreation.

ALTH AND ACCIDENT INSURANCE

e Student Health Service has arranged for and endorsed group health and cident insurance, on an elective basis, for those full-time students who do t have other coverage. Interested students should contact the Student Health rvice Office.

UNSELING CENTER

rector E. Lakin Phillips
sistant Director David L. Celio

e Counseling Center offers services designed to assist students in the diagnosis d treatment of academic, personal, and social problems. The Center also ers vocational counseling and programmed instruction, and refers individuals qualified agencies for assistance with problems not handled by the Center. havior therapy, individual and group psychotherapy, and individual and up counseling are also available.

The Center also provides special assessments including diagnostic measures scribed by the School of Engineering and Applied Science, admissions tests the University and for other selected educational institutions, and some cted assessments for business and industry.

Fees.—Students who are currently registered as degree candidates in the iversity are entitled to one interview without charge. If the student decides continue to use the services offered, a minimum flat fee of $30 will be rged for short-term treatment. Fees for testing and long-term treatment end upon the services involved. All fees are payable at the Counseling nter Office.

TERNATIONAL STUDENTS

viser Ray Clements

ernational House is the campus center for students from foreign countries. erves also as the headquarters of the International Students' Society, which ks to promote international friendship and understanding by welcoming to membership students from all countries, including those from the United tes.

The Adviser to International Students has his Office in International House is available each day throughout the school week for consultation on im- gration regulations and on any matters concerning the social and academic fare of students from abroad.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

Director Gertrude McSurely
Associate Career Services Officer William Stovall
Assistant Career Services Officer Cynthia Walker

The Student and Alumni Career Services Office provides assistance to d
seeking students and alumni seeking full-time, part-time, temporary, or p
nent employment. All students are urged to become acquainted with the se
of this Office early in their college experience.

Counseling concerning trends in employment, areas of employment, v
test and examination announcements, preparation for job interviews, re
writing, and other procedures for successful job application are always
able. Specific career openings; an on-campus recruitment program by bus
industry, government, and school systems; volunteer opportunities; and
time and temporary jobs for students while attending school are all part o
service. Referral and placement functions of the on-campus College Work-
Program are handled by the Student and Alumni Career Services
Teacher credential files initiated by persons seeking employment in all e
tional fields are maintained in this Office.

An understanding and knowledgeable approach to avenues of servic
those people who do not find career satisfaction in the structured syste
business, government, and education is also provided in the Student and Al
Career Services Office.

RELIGIOUS LIFE

The University recognizes the contribution that religion makes to the life
students and encourages them to participate in the various religious orga
tions of their own choice. Catholic, Jewish, and Protestant bodies sp
various groups and form a link between the University and the religious
munity. The advisers of the religious organizations are available for counse

Religious services in various traditions are provided regularly for the
versity community as announced.

STUDENT ACTIVITIES

Director of Student Activities David Speck
Activities and Orientation Coordinator John Perkins
Program Coordinator Leila Lesko
Assistant to the Director Irene Cavanagh

The offices of the Vice President for Student Affairs, the Dean of Students
Director of the Cloyd Heck Marvin Center, and the Director of Student A
ties are responsible for all co-curricular phases of student life.

STUDENT ACTIVITIES OFFICE

The Student Activities Office assists individual students and organizatio
program development, campus leadership training, and participation in sp
projects—both within the University community and in the community at l
This Office also serves as a central clearinghouse for development and

nance of a master activities calendar—for registering and assisting campus ganizations, for scheduling facilities (except in the Marvin Center) and events, d for informing the University community of the many activities and pro- ams which can enrich the educational experience through a variety of weekly, onthly, and annual publications. The Student Activities Office is also respon- ble for coordinating a comprehensive orientation program for new students tering the University. Students interested in participating in the many social, ltural, or extracurricular phases of University life should acquaint themselves ith the facilities and functions of the Student Activities Office and its staff.

NIVERSITY COMMITTEES AND ORGANIZATIONS

he George Washington University is an active, working community where udent involvement has become a motivating force in the governance of the niversity through the committee structure. This involvement has helped velop policies and programs beneficial not only to the student population, ut to the total University community. While serving on these committees, udent members are able to participate in the formulation and the application ongoing institutional policy.

There are numerous committees on which members of the student body are ble to serve. The Student Activities Office has a relatively complete file on ajor committees, and interested students should inquire there for further formation. Additional information is also contained in the *Student Handbook*. brief description of some of these committees follows:

Joint Committee of Faculty and Students.—This administrative committee, eated in response to a resolution of the Faculty Senate, is composed of seven culty members, seven student members, and other ex officio members. Mem- ers of this Committee are appointed by the President.

The Committee is officially charged to "facilitate all efforts to improve udent-faculty relations," to "encourage student recommendations in all areas Senate policy-formulation which affect student life," and to "recommend anges in the 'Rules and Regulations Governing the Conduct of Student ife.'" The Committee has specific advisory powers in many areas concerning udent-faculty relations and the interests of the student body.

Committee on the Judicial System.—The Committee on the Judicial System composed of three faculty members and three student members, one of whom the Chairman of the Student Court, one a student member of the Student- aculty Committee on Appeals, and one selected from the campus at large. he Committee on the Judicial System works closely with the Executive ecretary to the Judicial System to make sure that the various hearing bodies e efficiently, fairly, and expeditiously conducting their business.

Other committees include the following: the Committee on University Park- g, the Committee on Religious Life, the Committee on Sponsored Research, e Committee on Student Publications, and the Committee on the University ookstore.

TANDING COMMITTEES IN SCHOOLS AND COLLEGES

he schools and colleges maintain various standing committees concerned ith specific aspects of the college program; the majority are faculty com- ittees. One of particular interest to students, the Columbian College Advisory

Committee on Honors Program, includes three student representatives, erally chosen from alumni of the sophomore-year honors program. This visory Committee selects leaders for honors seminars in the College, rev independent-study projects, and advises concerning the merits of these proj Invitations to Committee membership are initiated by the College.

THE STUDENT NOMINATING BOARD

This all-student board was created by the President upon the recommenda of the Joint Committee of Faculty and Students in February, 1971. The Bo was established "to make appointments to all University Committees that h student members where there is no other existing means by or through organ tional charter or constitution to do so."

The members of the Student Nominating Board are the President of Mo Board; the President of Omicron Delta Kappa; a student member of the Gra ate School of Arts and Sciences Advisory Council; and one representa from each of the following: Residence Hall Association, Engineers' Cou Joint Committee of Faculty and Students, Student Bar Association, and A ciation of Medical Students.

THE PROGRAM BOARD

The University Program Board, through its student committee structure membership, provides a variety of cultural, social, and recreational progr on campus. As a result, students are afforded opportunities to broaden th educational experiences by developing and participating in those progra which contribute to the life of the University community.

Student membership on the Program Board is composed of four execut officers (Chairperson, Vice Chairperson, Secretary, Treasurer) elected fr the general student body in the spring semester, and five committee ch people appointed after that election. The seven committees of the Progr Board are the Art Gallery Committee, Concert Committee, Film-Vi Committee, Performing Arts Committee, Public Affairs Committee, Pub Relations Committee, and Special Programming Committee. These stude work with appointed faculty members and professional staff from the Divis of Student Affairs in carrying out their many programs and activities.

STUDENT ORGANIZATIONS

The following is a representative list of organizations active at the Univer during 1973-74. More complete information on these and other organizati is available at the Student Activities Office.

ACADEMIC, DEPARTMENTAL, DIVISIONAL, OR SCHOOL ORGANIZATIONS

American Civilization Undergraduate Majors, Anthropology Club, Enosin (debating) Society, Eta Sigma Phi (Latin and Greek fraternity), Geology C German Club, Public Administration Students Organization, Russian C Sigma Alpha Eta (speech and hearing fraternity), School of Public and In national Affairs Advisory Board.

NOR SOCIETIES

Phi Beta Kappa.—A national honor society recognizing "outstanding intel-tual capacity well employed" in the field of liberal arts and sciences. Senior d junior students who are candidates for the degree of Bachelor of Arts or chelor of Science in Columbian College and who have shown broad cultural terests, distinguished scholarly achievement, high character, general promise, d scholarly ideals may, to a number not exceeding 15 per cent of a class, be ected to membership by the Faculty members of the Alpha Chapter of the istrict of Columbia. Seniors and juniors in other schools of the University ho meet the above requirements are also eligible for consideration for mem-rship, provided that their program of studies includes appreciable work in e liberal arts.

Sigma Xi.—A national scientific honor society, the purpose of which is to courage original investigation in science, pure and applied. Outstanding aduate students in the sciences are eligible for full membership, and under-aduates who have shown marked ability in research may be elected to asso-ate membership.

Delphi.—An intersorority honorary society.

Delta Phi Alpha.—A national German honor society.

Delta Sigma Rho-Tau Kappa Alpha.—A national forensic society.

Dobro Slovo.—A national Slavic honor society for graduate and undergradu-e students.

Mortar Board.—A national society for juniors and seniors stressing leader-ip, scholarship, and service.

Omicron Delta Kappa.—A national society emphasizing leadership in extra-rricular activities.

Phi Eta Sigma.—A national society, established to encourage and reward gh scholarship and attainment, membership in which is limited to those fresh-en who attain a scholastic average of at least 3.50 or the equivalent.

Pi Delta Phi.—A national French honor society.

Pi Lambda Theta.—A national honor society recognizing excellence in schol-tic achievement and leadership among students in education.

Pi Mu Epsilon.—A national mathematics honorary.

Psi Chi.—A rational psychology fraternity.

Sigma Delta Pi.—A national Spanish honor society.

TERNATIONAL AND CULTURAL EXCHANGE ORGANIZATIONS

aravansary International, Indian Cultural Association, International Students' ociety, Korean Students Association, Organization of Arab Students, Students ternational Meditation Society, Wah Geo Club.

ERFORMING ARTS

rt Gallery Committee of the Program Board; Cherry Pie Film Festival; Con-rt Committee of the Program Board; George Washington University Dance ompany; Performing Arts Committee of the Program Board; University hamber Choir, Chorus, Orchestra; University Players. A variety of programs presented by these groups throughout the academic year.

POLITICAL ORGANIZATIONS

GW College Young Republicans, GW Young Democrats, GWU Ripon
ciety, Political Affairs Committee of the Program Board, Young Americans
Freedom, Young Socialist Alliance.

PROFESSIONAL ORGANIZATIONS

Alpha Chi Sigma (chemistry), Alpha Kappa Psi (commerce and economi
Personnel Society, Pre-Legal Society, Pre-Medical Society, Sigma Delta
(journalism), Student Planning Association.

PUBLICATIONS AND COMMUNICATIONS

The Cherry Tree (yearbook), *G.W. Forum* (student-faculty journal), *Poto*
Review (publication of Consortium graduate students), *The Rock Creek* (li
ary magazine), *Student Directory*, *This Month* (listing of major cultural ev
in the Washington area), *This Week* (weekly listing of scheduled events),
University Hatchet (semi-weekly newspaper), *Where to Go Guide* (sh
stores, and services in the campus area), WRGW (University radio stati

RELIGIOUS ORGANIZATIONS

Baptist Student Union, B'Nai B'rith Hillel Foundation, Christian Science
ganization, Eastern Orthodox Club, Lutheran Student Association, Newm
Foundation, Nichiren Sho Shu Study Academy, Religious Society of Friel
Satsang, Unitarian-Universalist Club, United Christian Fellowship, We
Foundation.

SERVICE ORGANIZATIONS

Circle K, Ecology Action, Freedom Shore Experience, GW Day Care Comm
tee, GW Medical Aid, Project Share, RAP-ID RESCUE, St. Elizabeths Ho
tal Project, SERVE, Student Volunteer Action Council.

SOCIAL FRATERNITIES

Delta Tau Delta, Kappa Sigma, Phi Sigma Delta, Sigma Alpha Epsilon, Sig
Chi, Sigma Nu, Sigma Phi Epsilon, Tau Kappa Epsilon.

SOCIAL SORORITIES

Delta Gamma, Kappa Alpha Theta, Kappa Kappa Gamma. A Panhelle
Council includes representatives of all sorority chapters at the University

SPECIAL INTEREST AND ADVOCATE GROUPS

Black People's Union; Campus Association for Principled Education; Comm
sion on Model Government; D.C. Public Interest Research Group, GW Chap
Gay People's Alliance; GW Labor Committee; Jewish Activist Front; Peop
Union; Student/Faculty Union for an Open University; Student Mobilizat
Committee; Women's Liberation.

RTS, HOBBIES, RECREATIONAL ORGANIZATIONS

nda Marga Yoga Society, Bridge Club, Cheerleaders, Folkdance, GW Ama-
r Radio Club, GWU Chapter of Yoga Institute of Washington, GWU Grotto,
VU Parachute Club, GWU Rugby Club, Ski Club.

ATHLETICS AND INTRAMURAL SPORTS

e University is a member of the National Collegiate Athletic Association
the Eastern College Athletic Conference. Its teams participate against
jor universities throughout the Midwest and Eastern Seaboard. The inter-
legiate program is comprised of basketball, baseball, soccer, tennis, golf,
stling, rifle, crew, and cross country.
The University offers a broad program of intramural sports activities for
h men and women through the Department of Physical Education, Health,
Recreation.

MAJOR PROGRAM EVENTS

Art Exhibits.—The work of locally, nationally, and internationally known
ists is shown in monthly exhibits in the Dimock Gallery in Lisner Lounge
in the art gallery of the Cloyd Heck Marvin Center. With the cooperation
the Curator of Art, an annual student art exhibit is presented.
Concert Series.—The Department of Music presents an artist concert series
five concerts each year.
Orchestra and Chorus Concert Series.—The University Orchestra and Chorus
two facets of the lively arts available to students either as credit courses or
extracurricular activities. The Chorus presents major performances to the
iversity community four or five times a year, including regular Christmas and
ing concerts. The University Orchestra presents four or five concerts a year.
Program Board Series.—The University Program Board sponsors concerts
h semester at which nationally known entertainers perform.
Recreation Program.—The University Recreation Association and the De-
tment of Physical Education, Health, and Recreation arrange a wide variety
sports and recreational activities and special events for all students.
Theatre.—The Drama Department produces seven major plays during the
r on the new proscenium/thrust stage in the Dorothy Betts Marvin Theatre
in Lisner Auditorium. Several original and experimental plays are pro-
ed in the Experimental Theatre. Students have the opportunity to participate
ll aspects of theatre and may receive credit toward their B.A. or M.F.A.
rees for some of their production work.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

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Assistant Deans Barbara Dunham, J.L. Métivier, Jr., R. C. Rutledge, H.E. Yeide, Jr.

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ected by the Faculty to serve through the designated year.

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* Elected by the Faculty.
† This Council serves both Columbian College of Arts and Sciences and the Graduate School and Sciences. The President of the University, the Vice President for Academic Affairs, the Columbian College of Arts and Sciences, and the Dean of the Graduate School of Arts and are ex officio members of the Council.

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INTRODUCTION

ce its founding in 1821, Columbian College of Arts and Sciences, the liberal
s college of the University, has continued to expand and develop with the
y of Washington. Its central situation makes participation in the life of the
tion's capital convenient for resident students. The cosmopolitan nature of
student body reflects the atmosphere of a great world capital. Because the
dents come from the fifty states and from ninety foreign countries, class dis-
ssions and casual student conversations are enriched by a challenging variety
viewpoints.

Throughout its history, the College has kept pace with, and often led, move-
nts of reform in higher education. Sensitive to the rapidly changing patterns
student and social needs, notably the increasing maturity and knowledge of
modern incoming freshman, the College in 1971 inaugurated sweeping
anges in its academic programs. In brief summary, the changes are designed
(1) permit the able student to earn his baccalaureate degree in less than
standard four years, either by earning credit through a wide variety of
aminations or by performing with excellence within a 90-semester-hour three-
ar program; (2) provide each student with a greater opportunity to design
own academic program by eliminating almost all specific course require-
nts except in the major field; (3) encourage an early and close association
tween the student and individual faculty members in the field of the student's
ief interest; and (4) foster a spirit of community and shared responsibility
tween faculty and student.

Opportunities exist for double majors; interdisciplinary programs; and, in
case of the student who finds no existing major or program suitable to his
ucational goals, special interdisciplinary programs which may be developed
the student, in consultation with departmental advisers and with the final
proval of the Committee on Programs.

Columbian College offers programs leading to the degrees of Associate in
ts, Bachelor of Arts, and Bachelor of Science; prelegal and premedical
ograms; the first two years of the professional programs in Education and in
blic and International Affairs.

Columbian College has degree-granting authority over the off-campus pro leading to the degrees of Associate in Arts in General Studies, Bachel General Studies (areas of concentration in history, mathematics, po science, psychology, and sociology), Bachelor of Science in Geodetic and graphic Science (areas of concentration in cartography and geodesy) Bachelor of Science in Oceanography.

These off-campus degree programs are administered by the College of eral Studies. For further information see the *College of General Studies* logue.

THE COLUMBIAN COLLEGE PROGRAM

The Columbian College program is a contemporary application of the hi liberal arts tradition. Its purpose is to enable the student to develop bot particular abilities and his general awareness as a human being. It deman the student a thorough acquaintance with one major area of learning a the same time an understanding of how that specialization fits into the l context of the scientific, social, and moral problems which confront mo man. It stresses not merely expertness but that broadly enlightened exper which encourages its graduates to grow through the years in ability and wis

SOPHOMORE YEAR IN PARIS PROGRAM

Freshmen who have received grades of *C* or higher in all course work d the first semester may be eligible to participate in the George Washi University-American College in Paris Sophomore Year in Paris Prog Qualified students will be encouraged to accept this opportunity to profit the cultural and intellectual riches of Europe by spending their second living and studying in Paris. Credits earned in this Program will be tra rable toward a degree in Columbian College of Arts and Sciences. Sinc courses are taught in English, a knowledge of French is not mandatory, b desirable.

General Information

ENTRANCE REQUIREMENTS

GOOD CHARACTER and an academic background appropriate for the progra studies contemplated are required.

Requirements for admission to the freshman class are as follows:

1. An acceptable certificate of graduation from an accredited secon school, showing at least fifteen units* which must include four years of En at least two years of one foreign language; two years of science, prefe with laboratory instruction; two years of social studies, one of which mu American history; and two years of college preparatory mathematics.

* A unit represents a year's study in a secondary school subject, including in the aggregate than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

2. The principal's statement that the applicant is prepared to undertake college work.

3. College Entrance Examination Board scores submitted on the Scholastic Aptitude Test and the English Composition Achievement Test.

It is recommended that the examinations be taken in December or January. Scores on tests taken in the junior year may be submitted. Arrangements for tests are the responsibility of the applicant and should be made with the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947 Center Street, Berkeley, Calif. 94704, not less than one month before the date of the test. In applying for the test, the applicant should specify that the scores be sent to the Office of Admissions, George Washington University, Washington, D.C. 20006.

The College Entrance Examination Board tests are preferred; however, the American College Testing battery scores will be accepted. The applicant should request that these scores be sent to the Office of Admissions directly from the American College Testing Program, Iowa City, Iowa. It is recommended that the applicant take the tests in October of the senior year.

The Committee on Admission and Advanced Standing will consider the adequacy of the qualifications of an applicant who, because of unusual circumstances, does not persent all of the formal requirements stated on pages 68-69. The Committee may prescribe appropriate scholastic-aptitude tests of the University.

REGULATIONS

Regulations regarding ADMISSION, REGISTRATION, FEES AND FINANCES *are stated on pages 21-32; other University regulations, on pages 43-50.*

ACADEMIC WORK LOAD

To encourage academic performance of high quality, the student's work load is limited.

A full-time student not on probation may take a course load of as much as 18 semester hours. A student employed more than 20 hours a week who is not on probation may take not more than 10 hours.

The amount of work taken by a student on probation may be limited by the Committee on Scholarship.

A full-time student who, during the immediately preceding semester, has received no grades below *B* and has earned grades of *A* in three courses totaling at least 9 semester hours may take 18 or 19 hours. An employed student who, during the immediately preceding semester, has received no grades below *B* and has earned grades of *A* in two courses totaling at least 6 semester hours may take 12 hours.

A student who accepts employment after registration or at any time during the semester must report that fact immediately to the Dean so that his program may be adjusted, if necessary.

ATTENDANCE

The student is held responsible for all the work of the course in which he is registered, and all absences must be excused by the instructor in charge before provision is made for the student to make up work missed.

USE OF CORRECT ENGLISH

The use of correct English, oral and written, is required in all courses student whose English in any course whatever is deemed unsatisfactory reported by the instructor to the Dean and to the Committee on the Correct English. The Chairman of the Committee may assign supplem work, without academic credit, varying in amount with the needs of th dent. If the work prescribed is equivalent to a course, the regular tuiti is charged. The granting of a degree may be delayed by failure to ma any such deficiency in English to the satisfaction of the Committee a Dean.

HONORS

Sophomore Honors Program.—Columbian College offers an honors pr for selected sophomores. The program is designed to provide an appro challenge and opportunity for gifted students; to permit early identificati students with the highest potential for high-quality graduate work and s in competitive award programs; to introduce educational innovations may possibly be applied at a later date to the student body at large; to together a group of students whose activities will enable them to cont more significantly to academic discussion within the University as a and to involve superior students in a program unmistakably identified wit liberal arts ideal of the generally educated man, thus balancing the empha concentrated study that is the heart of existing departmental honors prog

The program normally consists of 2 honors seminars (see page 332), limited to approximately 15 students. Each seminar carries 3 semester of credit, and represents elective hours in the student's program. Directo the seminars invite expert faculty members from different fields to ass discussion of particular problems. Students may elect a program of inde ent study in place of the second seminar.

Participants in the Honors Program are selected at the end of their first on the basis of an application to the program. All students who earn four g or *B* or better in their first semester are automatically eligible to apply. students doing high-quality work may apply on the recommendation of t their instructors.

A student will have the designation "sophomore honors" entered int permanent record if he (1) completes successfully 2 semesters of honors and (2) earns grades of *B* or better in 16 courses during his first two yea study.

Dean's List.—The name of every student who takes a minimum of 15 s ter hours in any one semester, who receives grades of *A* in at least 60 cent of the course work taken in that semester, and who has no grades bel for that semester, is placed on the Dean's List for that semester.

ACADEMIC STANDING

A student who is not suspended or on probation is considered to be in standing.

The following rules governing probation and suspension are applica stated to students enrolled for a full-time program (12 semester hours or m during the fall or spring semester. Students enrolled for less than 12 se

urs during the fall or spring semester and students enrolled during the sum-
er sessions are subject to probation or suspension on the basis of their record
four courses (3 or more semester hours of credit each), or multiples thereof,
her than on their record in any one semester.

OBATION

student who in one semester receives two grades of *F* in courses carrying
or more semester hours of credit each, or the equivalent, is placed on proba-
n. A student in his first semester on probation who receives one grade of *F*
such a course will be continued on probation for a second semester. Two
ades of *D* will be treated as equivalent to one grade of *F* in determining pro-
tion. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a
rt of the record for the semester during which the *I* is removed. A student on
obation taking 12 or more semester hours whose grades are all *C* or better is
moved from probation.

SPENSION

student who in one semester receives grades of *F* in three courses carrying
or more semester hours of credit each, or the equivalent, is suspended. A
dent in his first semester on probation who receives two or more grades of
in such courses is suspended. A student who receives one or more grades
F in such courses in any later semester on probation is suspended. Two
ades of *D* will be treated as equivalent to one grade of *F* in determining sus-
nsion. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a
rt of the record for the semester during which the *I* is removed.
The minimum period of academic suspension is one fall or one spring se-
ester. Final dates for applying for readmission are the same as those gov-
ning "Undergraduate Admission" (see pages 21-24). A suspended student
eking readmission must submit evidence to the Committee on Admission
d Advanced Standing that during his absence from the University he has so
nducted himself as to indicate that he will profit by readmission. A student
spended twice for poor scholarship will not be readmitted.

D-SEMESTER WARNING

hen, at the end of the sixth week of each semester, instructors file in the Office
the Dean the names of freshman and sophomore students who are doing
satisfactory work, a notice of Warning is sent to the student and a copy
ed with the appropriate adviser. A "Warning" constitutes notice to the stu-
nt that he should consult his instructor and adviser at the earliest opportunity.

COMPLETE/AUTHORIZED WITHDRAWAL

nditions under which the grades of *I* (Incomplete) or *W* (Authorized With-
awal) may be assigned are described on page 44.
Removing an Incomplete.—The grade of *I* must be removed no later than the
st day of the examination period for the fall or spring semester immediately
llowing the semester or summer session in which the grade of *I* is assigned.
n "Incomplete" that is not removed within this period is automatically changed
an *F*. In cases of well-documented extenuating circumstances, an instructor
d a student may jointly petition the Dean, or the appropriate committee, for

additional time in which to complete the work of the course. Such pet
should be submitted within the same period. The grade of *I* cannot be rem
by reregistering for the course here, or by taking its equivalent elsewhere.

CORRESPONDENCE AND HOME-STUDY COURSES

No credit is given for work done by correspondence or in home-study cou

CLASSIFICATION OF STUDENTS

A *freshman* is a student who has completed less than 30 semester h
A student becomes a *sophomore* when he completes 30 semester hours. A
dent becomes a *junior* when he completes 60 semester hours. A student bec
a *senior* when he completes 90 semester hours.

An *unclassified student* is one who is not a candidate for a Bachelor's de
(normally because he already holds one), but who wishes for valid acad
reasons to take a limited program for a limited time. Registration in this s
is permitted only with the prior approval of the appropriate Dean's Cou

ADVISORY SYSTEM

Each student is provided with both academic advising and personal counse
Academic advising is performed by members of the Faculty selected for t
knowledge of academic programs, and each student makes up his prograf
consultation with the adviser assigned to him before registration. A stu
who has *not* selected a major field receives his academic advising fro
member of the Columbian College Committee on Student Advising (see p
66). A student who has selected his major field receives his academic adv
from the appropriate department, or from an interdepartmental commi
Personal counseling is available through the Office of the Dean of Student
through the University Counseling Center. All students are encouraged to m
tain close contact with their advisers.

Students who intend to transfer after the sophomore year to the Schoo
Education or the School of Public and International Affairs are assigned sp
advisers to assist them in planning their programs.

An academic warning system permits early attention to students whose w
falls below required standards. In such cases, students are asked to co
regularly with their advisers. On request, copies of academic warnings or
bation notices may be sent to parents or guardians, who are themselves
come to meet with members of the advisory staff.

ACADEMIC ADVISING CENTERS

Each Department has set up Academic Advising Centers where both ge
educational counseling and specific major-field advising is available to stud
The locations and hours of these Centers may be obtained from departme
offices.

As the freshman student deliberates his choice of a major, he should co
with faculty advisers in as many of these Centers as he wishes. Once a maj
selected, the student then receives all of his academic counseling from
Advising Center of his major department.

ECLARATION OF MAJOR

he student is encouraged to select his major field early, normally no later an the end of the freshman year. To declare his major, the student must ecure the proper form from the Office of Columbian College, take it to his cademic Advising Center, secure the signature of his adviser, and return the rm to the Office of Columbian College. No student is considered to have a ajor until this process is completed. Thereafter, the student receives academic uidance from a faculty adviser in his major-field department.

OLUMBIAN COLLEGE GENERAL COURSE REQUIREMENTS

ll candidates for the degree of Bachelor of Arts or Bachelor of Science are dmitted to a general arts and sciences curriculum until they choose a major eld. Except for two general course requirements, all curriculum requirements ading to the degrees of Bachelor of Arts and Bachelor of Science are estabshed by the various major field departments or programs.

The two general requirements are the following:

1. Each student must, during his freshman year, demonstrate adequate chievement in the field of English Composition, either by examination or by king Engl 9 or 10, and Engl 11 or 12. This requirement may not be postoned.

2. Each student at some point in his college career must undertake a "meangful initiation" into the three divisions of knowledge: Humanities, Natural nd Mathematical Sciences, and Social Studies. As each major field will ormally represent one of these three areas, the requirement may be fulfilled y taking no less than 6 semester hours in each of the other two areas. These credits may be in approved introductory courses, or in approved advanced ourses if the student is qualified and receives the instructor's permission. ormally, these 6-hour units must be taken in a single subject or department. ourses simply waived (no credit assigned) cannot satisfy the "meaningful itiation" requirements. Columbian College departments and programs are sted below under the three categories.

Humanities	*Natural and Mathematical Sciences*	*Social Studies*
Art		American Civilization
*Classics	Biological Sciences	Anthropology
*East Asian Languages and Literatures	Chemistry	Economics
English	Geology	Geography and Regional Science
*Germanic Languages and Literatures	Mathematics	History
Music	Physics	Journalism
Philosophy	Statistics	Political Science
Religion		Psychology
*Romance Languages and Literatures		Sociology
*Slavic Languages and Literatures		
Speech and Drama		

asic language courses (normally the first two years) are considered "tool studies" and are not ptable in fulfillment of "meaningful initiation" in the Humanities.

REQUIRED PLACEMENT EXAMINATIONS

English.—Students whose College Board English Composition Achieve Test scores suggest that they will benefit from more intensive training in positional skills may be assigned to Engl 9 or may be tested in vocabu spelling, grammar, standard usage, and writing skill before placement in e Engl 9 or 10. Students whose scores indicate superior competence will b lowed to waive the Engl 10 requirement. Those whose scores indicate mark superior competence will be allowed to waive both Engl 10 and Engl 11 o

Foreign Languages.—A student who has not been granted advanced stan and who wishes to continue in college the language begun in high school take a placement examination in one of the following: Chinese, French, man, Greek, Hebrew, Italian, Latin, Russian, or Spanish. Upon completio the examination, assignment is made to the appropriate course.

Mathematics.—New students accepted for registration in Math 30 ar quired, prior to registration, to take a placement examination in algebra trigonometry; those accepted for registration in Math 51 are required, to registration, to take a placement examination in algebra.

FOREIGN LANGUAGE REQUIREMENT

In most major programs requiring foreign languages a student must com satisfactorily the equivalent of two years of college work in a single for language.

A student offering for admission four acceptable high school units of a gle foreign language, or the equivalent, is not required to take any foreign guage.

A student who offers less than four units and wishes to continue the s language must take the language placement test.

In many instances foreign languages are required or recommended preparation for advanced work. The student should consult his adviser so appropriate foreign languages may be included, when necessary, in his prog

FIRST- AND SECOND-GROUP COURSES

First-group courses, those numbered from 1 to 100, are intended prim for freshmen and sophomores. Second-group courses, those numbered 101 to 200, are intended for juniors and seniors. However, a qualified fresh or sophomore may, with the permission of his adviser and of the depart concerned, take second-group courses. Such qualification is achieved by pas or waiving introductory courses or prerequisite courses in the first group.

COURSES IN THE MAJOR FIELD OR DEPARTMENT

Every student is given the opportunity of taking a wide range of liberal subjects—Humanities, Natural and Mathematical Sciences, Social Stud both as a means of laying the groundwork for his more concentrated m field study and as a means of determining what academic area is best ad to his interests and aptitudes. In order to enhance this opportunity and to over-specialization once a major has been selected, a maximum limitatio 60 hours has been placed on course work taken in the major field or de ment.

ROFESSIONAL COURSES

cept for majors in Applied Mathematics and for students intending to apply r the combined degree of Bachelor of Arts and Doctor of Medicine, no more an 12 hours of professional courses, e.g., courses offered in units of the niversity other than Columbian College, may be included in the hours re- ired for the Bachelor's degrees in Columbian College. Students electing pro- ssional courses under this rule must obtain the approval of the Dean before gistration.

XPERIMENTAL HUMANITIES/SERVICE-LEARNING PROGRAM

maximum of 21 semester hours in any combination of Experimental Hu- anities courses and Service-Learning Program courses may be credited to- ard Bachelor's degrees in Columbian College.

ARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

student may earn semester-hour credits up to a maximum of 30 hours, or ive curricular requirements without limitation, by performing satisfactorily any or all of the following tests: Advanced Placement Tests (see page 23), hievement Tests (may be used to waive requirements only), College-Level amination Program, Special Examinations—provided by the departments of lumbian College of Arts and Sciences on an individual basis. *Passing a iver examination does not entitle the student to any semester hours of credit.*

Achievement Tests.—See page 24.

College-Level Examination Program (CLEP).—CLEP offers two types of aminations:

CLEP Subject Examinations are offered in 29 subject areas. These tests asure achievement in the equivalent of specific college-level courses. (Credit y not be earned by passing the examination after having taken the equivalent urse.)

CLEP General Examinations—offered in five areas: Mathematics, Social ences, Humanities, the Natural Sciences, and English Composition. (Credit— anced standing—is not given for the General Test in English Composition.) be eligible to take the CLEP General Examinations, a student must have n out of secondary school for three years or more, and he must not have n enrolled in any regular college program during that time.

Special Examinations Offered by Departments.—A student may request any artment of Columbian College to offer him a special examination covering subject matter of any specific course. (If an appropriate CLEP Subject amination is available, the department may choose to employ it.) If a stu- t performs satisfactorily, he may receive credit (advanced standing), waiver a requirement, *or both*, at the discretion of the department. (A student who previously taken examinations to waive course requirements may not, vever, at a later time take examinations for credit in the same courses.) cial departmental examinations will normally be of at least three hours' ation. A fee of $25 for each course examination is charged for preparing, inistering, and grading.

Preprofessional Requirements

STUDENTS WHO PLAN TO MAJOR in any program offered by the School of E cation or the School of Public and International Affairs are registered dur the freshman and sophomore years in Columbian College. Requirements the first two years of these programs, as well as requirements for the f medical program, are listed on the following pages.

The program of study leading to the degree of Bachelor of Science in Medi Technology, formerly offered by Columbian College of Arts and Sciences, been transferred to the School of Medicine and Health Sciences. Interes students should request the *School of Medicine and Health Sciences 1974* catalogue. Students who entered this program prior to September, 1973, sho complete the program in accordance with the requirements existing at the t they entered.

PREMEDICAL CURRICULUM

A premedical student who intends to work toward a Bachelor's degree ful the two general requirements of Columbian College (see page 73), and may follow the major field curricula of any Columbian College departm Each premedical program must be approved by the premedical adviser. admission to most medical schools the student must have a minimum of semester hours applicable towards a degree in an approved college of and sciences and the 90 hours must include

1. **Biology:** 8 semester hours. This may be either in general biology or zoo but may *not* include separately credited courses in botany.
2. **Chemistry:** 8 semester hours of general inorganic chemistry (which may clude qualitative analysis), including 4 semester hours of laboratory; and 6 semester hours of organic chemistry, including laboratory.
3. **Physics:** 8 semester hours, including at least 2 semester hours of labora
4. **English:** 6 semester hours. This may be the usual introductory college co or its equivalent.

Many medical schools have additional entrance requirements, among w are courses in biochemistry, embryology, histology, genetics, and mathema Even where such courses are not actually required, they are strongly rec mended.

With the exception of these specific requirements applicants are urge follow their personal interests in developing their premedical courses of st A well-balanced program, rather than a specific field, is the criterion by w an applicant is judged. It is not advisable to take courses that appear to c subject matter in the medical program.

While well-qualified candidates are eligible for admission after comple the minimum 90 semester-hour requirement, the majority of applicants found to be better prepared for the study of medicine after four years college work.

EDUCATION CURRICULUM

First two years in preparation for the Bachelor of Arts in Education degr the School of Education:

		Semester Hours
Engl:	Composition—Engl 9 or 10, 11	6
	Literature—Engl 51–52, 71–72, or 91–92	6
Math:	Two semesters to supplement senior high school courses, chosen from Math 3, 6, 9, and 10	6
*PE:	Any combination of first-group Physical Education, Health, and Recreation courses	3
Psyc:	Psyc 22	3
	Psyc 29 (for elementary majors) or 112 (for secondary majors)	3
Science:	Three semesters (2 in biological science and one in physical science or vice versa) to supplement senior high school courses in those fields, chosen from B Sc 3–4 or 11–12; Chem 3–4 or 11–12; Geol 1–2; or Phys 1 and 2, or 9–10. A secondary education major offering for admission 2 or more acceptable senior high school units in the above areas of science may be exempted from one semester of this requirement	9–12
Social Studies:	Hist 71–72, or P Sc 4 and 6 or 5 and 6	6
	Six semester hours selected from one of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; P Sc 4 and 6; P Sc 5 and 6; or Soc 1 and 2	6
Sp&D:	Sp&D 1 (or 11, if the Department so advises)	3
Elective:		12
	Total	63–66

YSICAL EDUCATION CURRICULUM

st two years in preparation for the Bachelor of Science in Physical Education gree with Specialization in Elementary or Secondary Physical Education in School of Education:

		Semester Hours
Engl:	Engl 9 or 10, 11	6
PE:	Any combination of first-group Physical Education, Health, and Recreation courses*	4
	PE 103	3
Psyc:	Psyc 22	3
	Psyc 29 (for elementary majors) or 112 (for secondary majors)	3
Math/Science:	B Sc 3–4; Chem 3–4; Geol 1–2; Math 9 and 10; or Phys 1 and 2, or 9–10	6–8
Social Studies:	Twelve semester hours selected from any two of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Hist 39–40; Hist 71–72; P Sc 4 and 6; P Sc 5 and 6; Soc 1 and 2	12

shmen and sophomores are required to take physical education unless they are registered for less 9 semester hours or unless regular employment during the day makes it necessary to take all s during the evening hours. Any other exemption will be granted only upon written petition has been recommended by the University Physician and approved by the Dean. Students pted from the physical education requirement must substitute an equivalent number of semester of electives.

		Se
Sp&D:	Sp&D 1 (or 11, if recommended by the Department)	
Elective:		
Total		6

First two years in preparation for the Bachelor of Science in Physical Educ degree with Specialization in Dance in the School of Education:

		Se
Engl:	Engl 9 or 10, 11	
PE:	Any combination of first-group courses in Dance and/or PE 121 and 123*	
	PE 103, 107, 108, 157	
Psyc:	Psyc 22, 112	
Math/Science:	B Sc 3–4; Chem 3–4; Geol 1–2; Math 9 and 10; or Phys 1 and 2, or 9–10	
Social Studies:	Twelve semester hours selected from any two of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Hist 39–40; Hist 71–72; P Sc 4 and 6; P Sc 5 and 6; Soc 1 and 2	
Sp&D:	Sp&D 1 (or 11, if recommended by the Department)	
Elective:		
Total		6

CHINESE LANGUAGE AND LITERATURE†

The first two years in preparation for the Bachelor of Arts degree with a m in Chinese Language and Literature in the School of Public and Internatio Affairs consists of a minimum of 60 semester hours. Each student must, du his freshman year, demonstrate adequate achievement in the field of Eng Composition, either by examination or by taking Engl 9 or 10, and Engl 1 12. Either while in Columbian College or the School of Public and Inte tional Affairs, he must also undertake a "meaningful initiation" into the t divisions of knowledge: Humanities, Natural and Mathematical Sciences, Social Studies. As the major field represents one of these three areas, requirement may be fulfilled by taking no less than 6 semester hours of proved introductory courses, or 6 semester hours in approved adva courses if the student is qualified and receives the instructor's permission the Natural and Mathematical Sciences and in Social Studies. Students include in their program of study Chin 1-2, 3-4, and 9; Chin 7-8 and 9 Chin 5-6. Chin 5-6 is preferred.

CHINESE STUDIES OR INTERNATIONAL AFFAIRS CURRICULUM

First two years in preparation for the Bachelor of Arts degree in the field

* Freshmen and sophomores are required to take first-group physical education activities cour specified second-group alternative courses) unless they are registered for less than 9 semester hou unless regular employment during the day makes it necessary to take all classes during the eve hours. Any other exemption will be granted only upon written petition which has been recomm by the University Physician and approved by the Dean. Students exempted from this requir must substitute an equivalent number of semester hours of electives.

† The degree of Bachelor of Arts with a field-of-study major in Chinese Language and Literat also available in Columbian College of Arts and Sciences (see page 257).

hinese Studies or International Affairs in the School of Public and International Affairs:

		Semester Hours
Engl: Humanities or AmCv:	Engl 9 or 10, and 11 or 12	6
	Art 31–32 or 71–72; *Literature (American, Chinese, East Asian, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; or AmCv 71–72	6
†Language:	Chinese, French, German, Hebrew, Italian, Russian, or Spanish	12–16
Math/Science:	B Sc 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10; or one course selected from Stat 51, 53, 91, and one course selected from Stat 97, 105, 111	6–8
Social Studies:	Econ 1–2; Hist 40 and 72; P Sc 4 and 6 or 5 and 6	18
‡Elective:		6–12
	Total	60

UBLIC AFFAIRS CURRICULUM

irst two years in preparation for the Bachelor of Arts degree in the field of ublic Affairs in the School of Public and International Affairs:

		Semester Hours
Engl: Humanities or AmCv:	Engl 9 or 10, and 11 or 12	6
	Art 31–32 or 71–72; *Literature (American, Chinese, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; or AmCv 71–72	6
Language or Statistics:	NOTE: This requirement may be satisfied by 2 years of one foreign language‡ or 12 semester hours of Statistics. Statistics courses taken to fulfill this requirement may not also satisfy the Math/Science requirement below.	12
Math/Science:	B Sc 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10; or one course selected from Stat 51, 53, 91, and one course selected from Stat 97, 105, 111	6–8
Social Studies:	Econ 1–2; Hist 40 and 71–72; P Sc 4 and 6 or 5 and 6	21
‡Elective:		7–9
	Total	60

f a student elects 6 semester hours of literature in any foreign language, this cannot be used satisfy the language requirement.
hin 5-6 is required for Chinese Studies majors. Greek and Latin not acceptable for International urs majors.
redit is not given for courses elected in Physical Education, Health, and Recreation.
reek and Latin not acceptable for Public Affairs majors.

URBAN AFFAIRS CURRICULUM

First two years in preparation for the Bachelor of Arts degree in the fie
Urban Affairs in the School of Public and International Affairs:

Engl:	Engl 9 or 10, and 11 or 12
Humanities or AmCv:	Art 31–32 or 71–72; Literature (American, Chinese, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; or AmCv 71–72
Math/Science:	B Sc 3–4 or 11–12; Chem 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10 NOTE: If a student elects two years of a foreign language, he may substitute two semesters of Statistics courses for the Math/Science requirement.
Social Studies:	Econ 1–2, Hist 71–72, and P Sc 4 and 6 or 5 and 6 Six semester hours selected from the following: Hum 40, 51–52, Soc 2
*Elective:	Students may substitute some of the required courses for the major (see page 168) for elective courses during the sophomore year
	Total

Degree Programs

ASSOCIATE IN ARTS DEGREE

THE ASSOCIATE IN ARTS DEGREE may be granted to a student who has compl
60 semester hours in arts and sciences with acceptable grades, and who has
filled the general requirements described on page 73. In addition, the degree
be awarded to Pre-Education and Pre-Public and International Affairs stud
upon completion of the curriculum specified for the first two years of
appropriate program. The last 15 semester hours of the program of st
must be completed in residence in Columbian College. A student wishin
receive this degree must file an "Application for Graduation" form and
the $10 graduation fee at the time of registration for the semester or sum
session in which he will complete his requirements.

THE BACHELOR'S DEGREES

Columbian College offers programs leading to the degrees of Bachelor of
and Bachelor of Science.

In cooperation with the School of Medicine and Health Sciences a seven-

* Credit is not given for courses elected in Physical Education, Health, and Recreation.

urriculum leading to the combined degrees of Bachelor of Arts and Doctor of Medicine is offered.

EQUIREMENTS FOR THE DEGREES

ESIDENCE

For the Standard 120-semester-hour Program.—A minimum of 30 semester ours, including at least 12 hours in the major field, must be completed in esidence in Columbian College. *Unless special permission is granted by the Dean to pursue work elsewhere, the work of the senior year must be completed n residence.* This requirement applies to students transferring within the Uni- ersity as well as to students transferring from other institutions.

For the 90-semester-hour Program.—The last 60 semester hours, including t least 12 hours in the major field, must be completed in residence in Colum- ian College.

Summer work may be counted in residence. For regulations governing students who are absent from the University for one semester or more, see "Continuous Registration," pages 46-47.

URRICULUM REQUIREMENTS

A change in degree candidacy within Columbian College (e.g., from Bachelor of Arts to Bachelor of Science) requires the permission of the Dean. The degree requirements effective at the time the change is approved must be met.

First-group courses may be required as prerequisites to the major, but because of their introductory character they cannot be counted as part of such programs. (See "Explanation of Course Numbers," pages 194-95.)

REDIT/NO CREDIT OPTION

A junior or senior student in Columbian College who is in good standing may, with the approval of his adviser and the Dean, take one course a semester and receive a grade of *CR*, Credit, or *NC*, No Credit. No student will be allowed o take more than four credit/no credit courses under this regulation. He may, however, in addition receive grades of *CR/NC* in the proseminar for field-of- study majors and in other courses normally using such grades. A student must ign up for the credit/no credit option at registration. Under no circumstances may a student change from credit/no credit status to graded status, or vice ersa, after the end of registration. Courses required in the student's major ield (courses required in the major department or those required outside the najor department) may not be taken on the credit/no credit basis. A transfer tudent may not choose this option until the second semester of his enrollment n this University.

UTORIAL STUDY

A junior or senior of demonstrated capacity, with a special interest in the ubject matter of a *regularly listed course*, may be permitted to take tutorial tudy *in residence* under the personal direction of the instructor, in accordance

with the rules of the appropriate department and with the approval o Dean. Credit under this plan is limited to the specific semester hours of designated for each course in the list of courses of instruction. It ass frequent and regular conferences between the student and instructor.

THE STANDARD 120-SEMESTER-HOUR PROGRAM

One hundred and twenty semester hours of course work are required graduation. In addition to the requirements stated on pages 73, 81-8 least 21 hours of course work outside of the major department or program required and no more than 60 hours of course work may be taken in any major field or department. The student should consult his adviser at registration about his choice of courses.

Each student should declare his major as soon as he is able, preferably the completion of his 30th semester hour. He may change the major only the consent of the Dean and of the department or committee concerned, he must meet the requirements for the new major in effect at the time change is approved.

Students transferring from other institutions or from other schools, colle or divisions in this University, with major requirements wholly or substanti met, must satisfy the residence requirement of Columbian College (see p 81).

THE 90-SEMESTER-HOUR PROGRAM

The 90-semester-hour degree program is designed for the exceptionally student. This program, which leads to the regular Columbian College degr makes it possible to graduate in three normal academic years with a total 90 semester hours of credit instead of the standard 120. Students in this gram must complete all of the requirements for the three-year degree in semester in which he achieves his 90th semester hour.

The requirements for this program are (1) 90 semester hours of cr earned in college courses (that is, the 90-hour requirement may not be duced by credit earned through examinations); (2) completion of the cho major-field program and general curricular requirements; (3) grades of A at least 45 semester hours of course work and *no* grades below *C*; (4) at le 60 semester hours of credit earned in 100-level courses; and (5) recommen tion of his major department or program.

To be eligible for this program, the student must show evidence of exc tional academic ability by college record, performance in college courses, other appropriate information.

An interested student should make application directly to his major-fi departmental chairman or program director as soon as possible, prefera by the end of his first year of study. His academic record to that point of course, provide a useful criterion of eligibility.

A transfer student may qualify for graduation under the 90-hour progr provided he satisfies the residence requirement of Columbian College (see p 81), earns grades of *A* in no less than 45 semester hours of course work, has no grades below *C*.

A student who fails to maintain the required academic performance wh studying toward the 90-hour degree program simply continues for the stand 120-hour degree.

ACHELOR OF ARTS

he Bachelor of Arts degree is offered in the following fields:

merican Civilization
merican Literature
nthropology
pplied Mathematics
pplied Statistics
rt History
iology
otany
hemistry
hinese Language and Literature
lassical Archaeology and Anthropology, studies in
lassical Archaeology and Classics, studies in
lassical Humanities
ramatic Art
conomics
nglish Literature
nvironmental Studies
ine Arts
rench Language and Literature
eography
eology
ermanic Languages and Literatures
History
Journalism
Judaic Studies
Latin
Latin American Studies
Mathematical Statistics
Mathematics
Music:
  Applied Music
  Music History and Literature
  Music Theory
Philosophy
Physics
Political Science
Psychology
Religion
Russian Language and Literature
Russian Literature and Culture—in Translation
Sociology
Spanish American Literature
Spanish Language and Literature
Speech Communication
Speech Pathology and Audiology
Zoology

OMBINED DEGREES OF BACHELOR OF ARTS AND DOCTOR OF EDICINE

candidate for the combined degrees of Bachelor of Arts and Doctor of Medicine must (1) complete the entrance requirements for the Doctor of Medicine egree in the School of Medicine and Health Sciences; (2) complete the general equirements stated on pages 73, 81-82; (3) accumulate 90 semester hours a the liberal arts, including a minimum of 30 in second-group courses in olumbian College; (4) obtain the approval of the Dean of Columbian College t the time of entering the School of Medicine and Health Sciences; (5) obtain he recommendation of the Dean for Academic Affairs of the Medical Center t the completion of all prescribed courses in the first year of the School of Medicine and Health Sciences, at which time the degree of Bachelor of Arts ill be conferred (professional work taken at another institution will not atisfy the major requirement of the combined degrees); (6) maintain throughut the entire course the scholarship level required for graduation.

ACHELOR OF SCIENCE

he Bachelor of Science degree is offered in the following fields:

Applied Mathematics
Applied Statistics
Biology
Botany
Chemistry
Environmental Studies
Geology
Mathematical Statistics
Mathematics
Physics
Zoology

THE UNDERGRADUATE MAJOR

There are two types of undergraduate majors: the Field-of-Study Majo the Departmental Major. Five majors, Classical Archaeology and An pology, Classical Archaeology and Classics, Environmental Studies, J Studies, and Latin American Studies, although interdepartmental in nature governed by the regulations of the Departmental Major.

FIELD-OF-STUDY MAJOR

Each Field-of-Study Major covers a carefully worked out field of coordin study and is under the supervision of the appropriate department and Columbian College Committee on Studies.

The Field-of-Study Major requires no specific program of courses, altho the student is required to meet the over-all general requirements for the gree. Ability to pass the Major Examination is assumed to be a convin demonstration that the student possesses the breadth, depth, and quality knowledge of his major usually defined in terms of semester hours, courses, grades. Information on each field is obtainable from the department. prospective student should place himself under the direction of the appropr adviser immediately upon declaring his major.

The Field-of-Study Major places special emphasis on the intellectual de opment of the individual student. Programs in the same major may va depending upon the individual student's background, previous study, and a tudes. The student is expected to consult his adviser frequently, and the s cial proseminar offered in some fields gives him further opportunity for in vidual advice and direction in pursuing a program especially adapted to needs and abilities. A close student-adviser relationship is essential for the s dent's success under the Field-of-Study Major plan.

The following Field-of-Study Majors are offered: American Civilizati American Literature, Chinese Language and Literature, English Literatu French Language and Literature, History, Religion, Russian Language Literature, Russian Literature and Culture—in Translation, Spanish Ameri Literature, Spanish Language and Literature.

Proseminar in the Major.—A proseminar is offered in most fields to help student acquire a coordinated knowledge of his field through reading, stu and laboratory exercises. It is a presentation of the content and methods of major field as a whole through the organization and coordination of the kno edge obtained in the various formal courses in the major subject and of m terial not usually included in such courses. This course is not required, but it is elected, strict attendance is essential. Six semester hours, but no qualita grade, may be assigned. When registered in this course, the student has privilege of visiting, subject to the approval of the instructor, any other propriate course offered in the College. (Regular attendance in a course, eit for credit or as an auditor, requires registration and payment of tuitio Proseminars are open only to the student who has been accepted as a can date under that specific major.

The Major Examination.—The Major Examination will normally be ta at the close of the senior year; a student on a limited schedule may take it earlier than one calendar year before graduation. A student who fails to p a Major Examination may, at the discretion of the Committee on Studies,

-examined at a later regular major-examination period. The Committee on udies has general supervision of the preparation, reading, and grading of ajor Examinations. Major Examinations are held each semester on dates ed by the department or departments concerned, but in no case later than ecember 1 for the fall semester, April 13 for the spring semester, and ugust 26 for the summer sessions.

EPARTMENTAL MAJORS

epartmental Majors, unlike Field-of-Study Majors, are defined in terms of redit hours, required courses, and the attainment of the grades of *A* or *B* half of the minimum required second-group courses taken in the major eld. The minimum specific requirements for Departmental Majors are listed elow the staff of instruction of the department concerned. The Chairman of e Department, or designated departmental adviser, should be consulted at egistration concerning the student's program of courses; and the entire pro- ram, including electives, must be approved by the Department. The student also expected to consult the Chairman or adviser in all matters affecting his rogram of studies, such as changes, substitutions, or withdrawals, and espe- ially concerning his progress in his course. A close student-adviser relation- hip is desirable.

Departmental Majors are offered in the following: American Literature, An- hropology, Applied Mathematics, Applied Statistics, Art History, Biology, otany, Chemistry, Classical Archaeology and Anthropology (interdepart- ental), Classical Archaeology and Classics (interdepartmental), Classical Hu- anities, Dramatic Art, Economics, English Literature, Environmental Studies, ine Arts, French Language and Literature, Geography, Geology, Germanic anguages and Literatures, Journalism, Judaic Studies, Latin, Latin American tudies (interdepartmental), Mathematical Statistics, Mathematics, Music Music History and Literature, Music Theory, Applied Music), Philosophy, hysics, Political Science, Psychology, Sociology, Spanish American Literature, panish Language and Literature, Speech Communication, Speech Pathology nd Audiology, Zoology.

OUBLE MAJORS

student who completes the requirements of two major fields (e.g., Mathe- atics and Physics, or English and Latin, or History and Economics, etc.) ay graduate with a double major. A student wishing to graduate with a ouble major should consult with advisers in the two departments concerned nd declare both majors on the appropriate forms available in the Dean's Office.

NTERDISCIPLINARY PROGRAMS

Regular Interdisciplinary Programs.—Several programs presently exist, in- uding American Civilization, Classical Archaeology and Anthropology, Classi- l Archaeology and Classics, Environmental Studies, Judaic Studies, and Latin merican Studies.

Special Interdisciplinary Programs.—A student who finds no existing major program suited to his educational goals may develop a special major pro- am of his own, in consultation with appropriate departmental advisers. Final

approval of such a program rests with the Committee on Programs. Only p
grams with valid and clearly defined academic goals will be approved, a
each shall be designated by a title suggested by the student to the Commit
on Programs for approval.

GRADUATE SCHOOL OF ARTS AND SCIENCES

Dean Henry Solomon
Assistant Deans E.A. Caress, D.A. Rowley

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HISTORY AND ORGANIZATION

The Graduate School of Arts and Sciences is responsible for advanced study and research leading to Master's degrees and the degree of Doctor of Philosophy in the arts and sciences. Graduate programs at George Washington University were first formally organized under a graduate School in 1905, following several decades of gradual growth in a number of departments. In 1930 the Graduate School was discontinued. Columbian College, the University's liberal arts college, then assumed responsibility for the Master of Arts and Master of Science degrees, and a newly created Graduate Council administered all Doctor of Philosophy programs. Professional schools took responsibility for advanced degrees in the professional fields.

In 1967 the Graduate Council and the Graduate Division of Columbian College were consolidated into a new Graduate School of Arts and Sciences. All graduate programs in the arts and sciences leading to the degrees of Master of Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Forsenic Sciences, Master of Music, Master of Science, Master of Science for Teachers, Master of Science in Forensic Science, Master of Science in Special Studies, and Doctor of Philosophy are under the Graduate School.

In addition, a Master of Philosophy degree is awarded by the School, upon recommendation of the appropriate department, to students who have successfully completed the General Examination for the Doctor of Philosophy degree.

The School is under the direction of the Graduate Faculty of Arts and Sciences. It is the responsibility of the Faculty to set the requirements for admission to the School, to provide courses and programs of study and research for its students, to establish academic standards for its degrees, to recommend to the Board of Trustees the awarding of degrees, to lay down regulations as needed for the operation of the School, and generally to supervise its activities.

The administration of the School is vested in the Dean, who is Chairman of the Dean's Council, which is responsible to the Faculty of the School for all policy matters.

ADMISSION REQUIREMENTS

Application forms for admission to graduate study are obtained from the Of of the Dean of the Graduate School of Arts and Sciences. When comple these application forms must be submitted to this Office, together with coll transcripts and letters of reference.

Applicants must have academic backgrounds of excellence, usually with jors, or equivalent, in the fields in which they intend to study for advan degrees. Normally, a *B* average (or equivalent) from an accredited colleg required. With evidence of special promise, such as high Graduate Rec Examination scores, an applicant may be accepted whose academic rec falls short of *B*. The minimum does not assure automatic acceptance. departments may, and often do, set higher admission standards. Moreo the number of spaces available for new graduate students limits the num that can be accepted. Students who apply in their senior year must have co pleted their baccalaureate work before registration in the Graduate School must present evidence of such completion. Students whose native languag not English are required to take the *Test of English as a Foreign Langu* (TOEFL), administered by the Educational Testing Service, Princeton, N.J

Application for Admission.—Completed applications and requests for fell ship support must be submitted by February 15 (February 1 for students Clinical Psychology and Art Therapy) for admission in the fall seme and by November 1 for the spring semester. Applications for grad study are acceptable after these dates for admission in the correspond semester and will be reviewed if time permits and if space is available in program desired.

Readmission.—A student who has failed to maintain continuous registra and wishes to resume his graduate program must file an application form be considered for readmission. Readmission is not guaranteed, and the ap cation is subject to review by the department concerned and the Dean. student may be required to take qualifying examinations on the course w completed. Application forms are available in the Graduate School Office.

REGULATIONS

Regulations regarding ADMISSION, REGISTRATION, FEES AND FINANCES *are st on pages 21-32; other University regulations, on pages 43-50.*

In addition, the Graduate School publishes a Student Handbook each demic year which contains updated information on the School's policies, re lations, and other matters of concern to enrolled or admitted students.

GRADES

Grades for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit.

The symbol *I* (Incomplete) indicates that a satisfactory explanation has be given to the instructor for the student's failure to complete the required w for a course. The "Incomplete" must be made up before the lapse of one endar year. An "Incomplete" which is not removed within one calendar y remains as a grade of *I* on the student's record. The grade of *I* cannot

removed by reregistering for the course here, or by taking its equivalent elsewhere.

The grade of *I* is also given for all thesis and dissertation research courses until the thesis or dissertation is completed. Upon the satisfactory completion of the thesis or dissertation the grade *I* is changed to *CR* automatically. The grade of *CR* is given for an *Advanced Reading and Research* (usually numbered 398) course.

SCHOLARSHIP REQUIREMENTS

Graduate students are expected to maintain a minimum accumulative grade average of *B* (3.00) in all course work in the program of studies. Individual departments may require a higher average. The fields of Art History, English, History, and Psychology require a 3.25 average.

In the case of a student who receives a grade of *F* for a course in his program of studies, the Graduate School will require a written statement from the department justifying the student's continuance in the Graduate School and outlining the program to be followed. Continuation is contingent upon the Dean's approval. A course in the program of studies for which an *F* is received cannot be subsequently removed from the program even though another course is taken as a substitute.

A student may repeat for credit a course in which he has received a grade of *C* or above *only when permitted to do so by the department concerned*, unless the course description states that the course may be repeated for credit. A written statement to this effect must be submitted for approval to the Dean's Office by the appropriate departmental adviser. It is then filed with the Registrar.

A graduate student may take an advanced undergraduate course (courses numbered 101-200) for graduate credit only upon the approval of the Dean and the department at the time of registration. Such approval is granted only with the provision that students complete additional work in order to receive graduate credit.

PROGRAM OF STUDIES

The program of studies must be approved by the departmental adviser and filed in the Graduate School Office no later than November 1 for graduate students entering in the fall semester, or March 15 for graduate students entering in the spring semester. A program of studies may be revised, when necessary, by obtaining the approval of the departmental adviser and the Dean. The revision must be filed in the Graduate School Office.

CONTINUOUS REGISTRATION

All students must maintain continuous registration while working toward a degree, except during the summer session. If continuous registration is not maintained, the student is dropped from the degree program unless leave of absence is granted by the Graduate School.

LEAVE OF ABSENCE

If a student is temporarily unable to continue his program of studies, he may

Subject	Degrees Offe
Chemistry	M.S.
Forensic Science	M.S. in Forens.S.
Geochemistry	M.S.
Geology	M.A., M.S.
Mathematical Statistics	M.A.
Mathematics	M.S. for Teachers, M.A.
Physics	M.A.
IV. Biomedical and Related Sciences	
Anatomic Pathology	M.S.
Anatomy	
Biochemistry	M.S.
*Biological Sciences	M.S.
Genetics	M.S.
Human Ecology	
Microbiology	M.S.
Mycology	M.S.
Pathology	
Pharmacology	M.S.
Physiology	M.S.
Psychology	M.A.
Speech Pathology and Audiology	M.A.

COMBINED MASTER OF SCIENCE AND DOCTOR OF MEDICINE DEGR

Students interested in the combined degrees of Master of Science and Doc of Medicine must meet the requirements for admission to the Graduate Sch of Arts and Sciences and to the Doctor of Medicine degree program of School of Medicine and Health Services.

The Master of Science program consists of a minimum of 30 semester ho of credit and the fulfilling of the tool requirement (see page 96). A maxim of 12 semester hours of credit for graduate-level courses *completed as a p of the Doctor of Medicine degree curriculum* (and not already applied tow the Bachelor's degree) will be allowed in fulfillment of the requirements of Master of Science degree. The remaining 18 semester hours of work, which most programs includes a thesis, must be work in the basic medical scien normally required for a Master of Science degree in the Graduate School Arts and Sciences.

DUAL PROGRAM FOR THE DOCTOR OF MEDICINE AND DOCTOR OF PHILOSOPHY DEGREES

A dual program is available to qualified students who seek both the Doctor Medicine and Doctor of Philosophy degrees. The requirements which must fulfilled for both degrees are identical to those currently and separately esta lished in the School of Medicine and Health Sciences and the Graduate Sch of Arts and Sciences.

A student working toward these degrees may apply a maximum of semester hours of approved course work in the School of Medicine and He Sciences toward the minimum of 48 hours of course work required to qua

* Biology, Botany, and Zoology.

or the General or Cumulative Examination for doctoral candidacy. This ourse work is normally taken during the semesters that alternate with his edical program and in the years following the award of his M.D. degree. he student's research for the dissertation may begin concurrently with the final 4 semester hours of graduate course work leading to the General or Cumu- tive Examination. The estimated time for the completion of this dual program six years.

In order to enter the dual degree program, a prospective student first must pply for and gain admission to both the Graduate School of Arts and Sciences nd the School of Medicine and Health Sciences separately through established rocedures. Upon admission to both schools, he may then apply for affiliation ith the dual degree program. Work toward the Doctor of Philosophy degree performed under the jurisdiction of a *departmental* Doctoral Committee.

REQUIREMENTS FOR THE DEGREES

HE MASTER'S PROGRAMS

Iost of the requirements listed below are applicable to candidates for the de- rees of Master of Arts, Master of Arts in Special Studies, Master of Fine rts, Master of Forensic Sciences, Master of Music, Master of Science, Master f Science for Teachers, Master of Science in Forensic Science, and Master of cience in Special Studies.

1. *General Requirements.*—For a Master's degree program *including* a esis, the satisfactory completion of a minimum of 30 semester hours of ap- roved graduate work, including 6 semester hours of thesis research, is required. or a Master's degree program which does *not* include a thesis, the number of emester hours of approved graduate course work is determined by the depart- ent, and normally consists of from 30 to 36 semester hours. The program ithout the thesis is not an individual student option and is not available in very department. Departments can and often do set requirements above the inimum required by the Graduate School. The program of study leading to the egree of Master of Arts in Special Studies or Master of Science in Special udies consists of 36 semester hours of approved graduate course work and oes not require a thesis.

Work taken to make up deficiencies is never counted as part of the require- ents leading to a Master's degree. Upon approval, up to one-half of the re- uired graduate work may be taken in courses offered by the other affiliated stitutions of the Consortium of Universities of the Washington Metropolitan rea, Inc., or by another degree-granting division of this University. If credit transferred from another institution (see "Transfer of Credit," page 96), the umber of semester hours which may be taken at an affiliated Consortium stitution is reduced by the number of hours accepted as transfer credit.

It is expected that a Master's candidate will complete degree requirements ithin 3 years. Extensions beyond this 3-year period require approval of a ritten request.

2. *Academic Work Load.*—Full-time students register for 9 to 12 semester ours each semester; part-time students register for a minimum of 6 semester ours each semester. These requirements do not apply when a student has wer than 9 semester hours (full-time) or 6 semester hours (part-time) re-

maining to complete his program. No more than 15 semester hours may taken during any one semester.

3. *Transfer of Credit.*—A maximum of one-quarter of the semester ho of graduate course work required for a degree may be approved for transfe the Graduate School from the Division of University Students, another deg granting division of this University, or another accredited college or univer under the following conditions: the course work must have been taken p to admission to the Graduate School, it must be approved as part of the dent's program of studies, it must not have been applied to the completion requirements for another degree, it must be graduate-level course work, it m have been taken within the past two years, and the student must have recei a grade of *B* or better. This action must be approved on a "Request For by the departmental adviser and the Dean. A transcript of the course wo must be on file before the request can be considered.

4. *Tool Requirement.*—Except for candidates for the degrees of Master Arts in the field of Art Therapy, Master of Arts in Special Studies, Master Forensic Sciences, Master of Music, Master of Science in Forensic Science, Master of Science in Special Studies; candidates for Master's degrees in Department of Mathematics; and candidates in the field of Dramatic Art the degree of Master of Fine Arts, Master's candidates normally must compl successfully a tool requirement in a foreign language, mathematics, statist or computer programming. In place of a tool requirement, candidates for degree of Master of Fine Arts in the fields of Ceramics, Design, Graph Painting, Photography, or Sculpture will complete a methods course selec by the Department of Art.

The tool requirement examination should be passed prior to the beginn of the third semester of graduate work; students who have not fulfilled requirement must register for the appropriate course at the beginning of third semester. Courses taken to satisfy the tool requirement cannot be coun in the semester-hour requirement for the Master's degree. No Master's can date may attempt a tool examination more than three times. A tool requirem fulfilled at another university cannot be used to fulfill the requirement at University.

With the approval of the department directing the student's program of stu the tool requirement may be selected from the following options:

(a) Passing a foreign language reading examination (a student may regis for the appropriate reading course for nonmajors or make arrangements w the appropriate department to take the examination on the scheduled dates) student majoring in a foreign language may not select that language to sati this requirement; a student whose native language is not English may ele English as the tool (students choosing English should contact the Engli Department).

(b) Completing with a grade of *B* or better a course in mathematics, tistics, or computer programming which is approved by the appropriate de partment and by the Graduate School; or passing a special examination co ering the approved course material, administered by the appropriate depa ment, at the level of the final examination.

5. *The Thesis.*—The main purpose of a Master's thesis is to demonstra the student's ability to make independent use of the information and trainin acquired through his other disciplines and to furnish objective evidence of

constructive powers in his chosen field. The student registers for 6 semester hours of thesis research and must complete the thesis no later than three calendar years after his initial registration. The student must maintain continuous registration during the period required to complete the thesis. Registration for thesis research entitles the student to the advice and direction of the member of the faculty under whom the thesis is to be written. The thesis subject must be approved by the professor who will be directing the thesis. The thesis, in its final form with one copy and a certificate of approval signed by the thesis director and at least one departmental reader, must be presented to the Dean no later than the date announced in the University Calendar. All theses must meet the form, style, and other requirements set forth in a pamphlet, *Information Concerning Theses and Dissertations*, available in the Office of the Dean.

6. *Master's Comprehensive Examination.*—Most Master's degree candidates must pass a Master's Comprehensive Examination in the major subject. Examinations are held on dates fixed by the departments, so that results can be filed in the Graduate School Office no later than the day before the faculty meets to approve the list of graduates (approximately two weeks before graduation).

A student who fails to pass the Master's Comprehensive Examination may, in exceptional circumstances, and with the approval of the department and the Dean, repeat the Examination at the next scheduled Examination date. If he fails a second time, no further opportunity to take the Examination is permitted.

THE DOCTOR OF PHILOSOPHY PROGRAM

The minimum requirements for the doctoral program are as follows:

1. *General Requirements.*—The program leading to the degree of Doctor of Philosophy requires the satisfactory completion of a minimum of 72 semester hours of approved graduate work for entering students whose highest earned degree is a baccalaureate. A minimum of 48 of these hours must be taken in preparation for the General Examination. Entering students whose highest earned degree is a Master's degree are required to register for a minimum of 48 semester hours of approved graduate work, no fewer than 24 of which must be taken in preparation for the General Examination. While completing the dissertation portion of the program, the student must register for 12 to 24 semester hours of *Dissertation Research*, depending on the number of hours completed prior to the General Examination. The exact number of semester hours required for any part of the total program is assigned by each department and may exceed the minimum required by the Graduate School.

2. *Academic Work Load.*—Full-time students register for 9 to 12 semester hours each semester; part-time students register for a minimum of 6 semester hours each semester. These requirements do not apply when a student has fewer than 9 semester hours (full-time) or 6 semester hours (part-time) remaining to complete his program.

3. *Transfer of Credit.*—Entering students who do not hold a Master's degree may request transfer of up to 24 semester hours of credit toward a doctoral degree for acceptable graduate work taken at the Master's degree level at George Washington University or another accredited college or university.

4. *Tool Requirements.*—As early as possible, and *before* completion of the General Examination, the tool requirements specified in the program of study

must be completed. The following rules apply to students permitted to e
(a) or (c) below: students entering the Graduate School with a Bachel
degree must satisfy the first tool requirement before completion of 15 seme
hours of course work; students entering with a Master's degree must satisfy
first tool requirement no later than the second semester of registration a
Doctor of Philosophy student. Courses taken to fulfill the tool requiren
are not counted in the semester-hour requirement for the Doctor of Philoso
degree program. The tool options are as follows:

(a) two foreign language reading examinations;

(b) high-level proficiency in one foreign language;

(c) one foreign language reading examination and the completion wit
grade of *B* or better of a course in mathematics, statistics, or computer
gramming which is approved by the appropriate department and by
Graduate School. It is possible to satisfy the latter part of the requirement
passing a special examination covering the approved course material, admi
tered by the appropriate department, at the level of the final examination.

A doctoral student whose native language is not English may not elect
native language to meet a foreign language examination requirement. With
approval of his department, he may elect English to fulfill the language requ
ment in any of the options listed above except (b). The student who is g
approval to take a language examination in English should make arrangem
with the Department of English.

A doctoral student may omit a tool preparation course at George Wash
ton University if he has had a similar course at another college or univer
However, his proficiency in that tool must be validated by an examinatio
this University.

Further details for meeting the various tool requirements are stated in
Graduate School's Student Handbook.

5. *The General Examination.*—Each student is required to complete
General Examination no later than the semester following the completion
course requirements. The General Examination is composed of a written
amination 5 to 6 hours in length in each of the areas of study comprising
student's total program; the time permitted between each examination is de
mined by the administering department. Some departments permit one or
areas of study to be "written off"; that is, a special, shorter examinati
given after a year of course work in the area. A cumulative examination
tem is in effect in the fields of Chemistry and Physiology, and in the fiel
Psychology a system of two comprehensive examinations is used. Student
these fields should consult the appropriate department for information ab
its system.

6. *The Degree of Master of Philosophy.*—Upon departmental recomme
tion, the degree of Master of Philosophy may be awarded to students who
successfully completed all requirements for the Doctor of Philosophy d
up to and including the General Examination. Not all departments recomm
students for this degree.

7. *The Dissertation and Final Examination.*—A dissertation is require
each doctoral candidate as evidence of his ability to perform scholarly res
and interpret its results. The candidate normally enrolls for *Dissertation
search* upon completion of the General Examination; however, he may re
for up to one-half of the required number of semester hours of *Dissert*

Research during the time the General Examination is being completed. After he required number of hours of *Dissertation Research* has been taken, if more ime is needed to complete the dissertation, the student must maintain con-inuous registration (see pages 46-47) each semester until the dissertation in fin-shed and the Final Examination is passed. If the dissertation is not completed vithin 5 years after the date of the General Examination is completed, the stu-lent may be required to retake the General Examination.

No later than the date specified in the University Calendar, the candidate nust submit to the Dean the original and one copy of the dissertation and an bstract for inclusion in the Announcement of the Final Examination and for eproduction by University Microfilms, Inc.

When the dissertation has been approved by the Director and two members f the Doctoral Program Committee and filed with the Dean, the candidate akes the Final Examination, an oral examination which is open to the public. A committee of examiners (composed of Graduate School Faculty and, when ppropriate, outside scholars) conducts the Examination. If the candidate asses, he is recommended by the Graduate School for the degree of Doctor f Philosophy.

Detailed information regarding regulations for the form and reproduction of ie dissertation is available in the Office of the Dean. The successful candidate or the doctorate is required, before receiving his degree, to pay a fee to cover ie expense of printing the Announcement of the Final Examination, and for ie basic service rendered by University Microfilms, Inc.

POSTDOCTORAL STUDY

George Washington University doctoral graduates may continue any studies in ie University without payment of tuition, and enjoy all University library rivileges. Such graduates are required to pay the usual "continuous registra-on" fee and the University Center fee in order to establish their active mem-ership in the University. The use of laboratory space and equipment is con-ngent upon availability, and the cost of all laboratory or special library ma-rial is paid by the graduate. Special arrangements for such privileges must be ade with the Dean two months in advance of the semester in which the raduate wishes to register. Postdoctoral work taken under this privilege may ot be applied toward any degree offered by the University.

FELLOWSHIPS AND FINANCIAL AID

limited number of graduate teaching fellowships are available in most de-rtments of instruction to students registered in the Graduate School of Arts d Sciences. Other kinds of sponsored and University awards are available, t limited.

Students applying for admission who also wish to apply for a fellowship ould submit the fellowship application and the application for admission by ebruary 15; the necessary transcripts, Graduate Record Examination scores, d letters of recommendation should also be on file by this date. Students rrently enrolled in the Graduate School should submit only the fellowship plication and have current letters of recommendation on file by February 15.

Forms are available at the Office of the Graduate School of Arts and ences. Filing the fellowship application entitles the student to consideration all awards available in his department.

Students who wish to apply for loans should indicate their intent to d on the application for admission. Information concerning loans is conta in a booklet, *Student Financial Aid*, available from the University's Stu Financial Aid Office.

COOPERATIVE PROGRAMS

The American Studies Program at George Washington University is affil with the American Studies Program of the Smithsonian Institution. This rangement offers the student in the field of American Civilization an op tunity to take advantage of the Washington environment. Members of the of the Smithsonian's American Studies Program, Museum of History and T nology, National Portrait Gallery, National Gallery of Art, and National Ga of Fine Arts offer seminars and tutorial instruction in fields which provide student with an unusual opportunity to develop new dimensions in the disci of American Civilization. This program of study is open to students wo toward the degrees of Master of Arts and Doctor of Philosophy, and is inte to prepare them for research, teaching, and museum-related careers.

The Department of Art at George Washington University and the Smith ian Institution offer a joint graduate program of study and research in mus studies leading to the degree of Master of Arts in the field of Art History a concentration in Museum Training. The Department has also establish program of study in affiliation with the Textile Museum, the Corcoran Ga of Art, and area private art galleries.

A program of study leading to the degree of Doctor of Philosoph American Civilization with emphasis on library research and collection offered jointly by George Washington University and the Library of Cong The coordinator of the Library Program and his staff offer an orient seminar and other courses and supervise students in reading and rese and in work on such library problems as indexing, cataloguing, and bib raphy.

For further information concerning these programs contact one of the fol ing offices at George Washington University: the Graduate School of Arts Sciences for those who are interested in any of the fields listed above, Department of Art for those interested in Museum Training, the Amer Studies Program for those interested in the American Civilization field.

George Washington University, in cooperation with three other reg universities and the Folger Shakespeare Library, has established the Fo Institute for Renaissance and 18th Century Studies as a cooperative ven in graduate studies in the humanities. Seminars (limited to twelve students e are offered each semester under the direction of outstanding American foreign scholars. The Folger Library is the physical center for the Institute participants enrolled in the seminars are granted access to the collections of books, manuscripts, and reference materials of the Library. There are also portunities for participants to establish personal relationships with the fel and readers at the Library, in the furtherance of their research. All regist students are eligible to apply for admission to one or more of the seminars.

hough priority in enrollment will be accorded to graduate students working on issertations and to postdoctoral scholars from the sponsoring institutions.

Further information, including a listing of seminar topics, is available in the Office of the Graduate School of Arts and Sciences of George Washington University or at the Folger Shakespeare Library.

The University and the National Bureau of Standards have entered into a cooperative agreement to further educational opportunity at both the University and the Bureau. This arrangement holds great promise for graduate study and research, particularly in the physical sciences.

SPECIAL OFF-CAMPUS DEGREE PROGRAMS

The Graduate School of Arts and Sciences is currently offering the following special degree programs off campus: (1) the degree of Master of Arts in Special Studies with areas of concentration in Legislative Affairs, or Urban Learning, and (2) the degree of Master of Science in Special Studies with areas of concentration in Higher Education Affairs, Investigative Techniques, Oral Biology, or Telecommunication Operations. The program in Oral Biology is offered in cooperation with the Naval Graduate Dental School of the National Naval Medical Center, Bethesda, Md., and in cooperation with the United States Army Institute of Dental Research at the Walter Reed Army Medical Center, Washington, D.C. The programs are open only to dental officers on active duty with the U.S. Armed Forces or with other federal agencies.

The Graduate School has academic jurisdiction over these off-campus programs which are administered by the College of General Studies. For details consult the Graduate School of Arts and Sciences.

SCHOOL OF EDUCATION

Dean Rodney Tillman
Assistant Dean R.E. Baker
Executive Assistant to the Dean L.H. Kornhauser

FACULTY*

Professors J.G. Allee, Jr., R.E. Baker, J.G. Boswell, Perry Botwin, J.L. Br
Marcella Brenner, W.T. Carroll, Mary Ellen Coleman, L.H. Elliott, R
Hanken, Donald Hawkins (*Research*), Eva Johnson, A.D. Kirsch, Anth
Marinaccio, Leonard Nadler, Martha Rashid, Carol St. Cyr, Daniel Sin
Loretta Stallings, Rodney Tillman, C.E. Vontress
Associate Professors S. Leigh Clark, R.S. Cottrell, Jr., R.J. Frankie, Lyn
George, Gloria Horrworth, Rita Ives, Virginia Kirkbride, E.P. Kulaw
Donald Linkowski, Margaret McIntyre, Dorothy Moore, Ruth Peter
Jeanne Snodgrass, G.D. Wiggs, Lawrence Winkler, Maida Withers
Adjunct Associate Professor D.C. Paup
Assistant Professors M.S. Castleberry, Janet Heddesheimer, Nancy John
J.A. Kuhagen (*Research*), Honey W. Nashman, S.R. Paratore, R.W. Pro
J.R. Shotel, G.W. Smith, M.G. Van Dyke
Adjunct Assistant Professor Nancy Roche
Instructors Mary Campbell, Joan Landy, Nancy Sobel, Linda Tsantis

MEMBERS OF THE ADVANCED GRADUATE FACULTY

R.E. Baker, J.G. Boswell, Perry Botwin, J.L. Breen, Marcella Brenner, W
Carroll, R.S. Cottrell, Jr., L.H. Elliott, R.F. Frankie, Gloria Horrworth,
Ives, Virginia Kirkbride, A.D. Kirsch, Donald Linkowski, Anthony M
naccio, Dorothy Moore, Leonard Nadler, Ruth Peterson, Martha Rashid, C
St. Cyr, Daniel Sinick, Loretta Stallings, Rodney Tillman, C.E. Vontress, G
Wiggs, Lawrence Winkler

COMMITTEES†

THE DEAN'S COUNCIL‡

1973: Donald Linkowski, S.R. Paratore
1974: Perry Botwin, Leonard Nadler
1975: Donald Hawkins, C.E. Vontress

* The President of the University, the Vice President for Academic Affairs, the Registrar of University, the Director of Admissions of the University, and the University Librarian are ex members of the Faculty of the School of Education.
† The Dean and the Assistant Dean of the School of Education are ex officio members of all mittees.
‡ Elected by the Faculty in the year designated to a three-year term.

COMMITTEE ON ADMISSION AND ADVANCED STANDING*

Rodney Tillman (*Chairman*), Perry Botwin, J.L. Breen, Donald Linkowski, J.Y. Ruth

COMMITTEE ON SCHOLARSHIP

Rodney Tillman (*Chairman*), Perry Botwin, J.L. Breen, Donald Linkowski

INTRODUCTION

It is the purpose of the School of Education to prepare teachers, counselors, and administrators for leadership responsibilities, and to offer experienced teachers opportunities to extend their education. The School includes the departments of Education; Physical Education, Health, and Recreation; and Special Education. It offers both graduate and undergraduate work. Other departments of the University provide general education and subject-matter courses needed for a well-balanced program of teacher education.

Individually planned programs are provided for liberal arts and other selected graduates who wish to prepare for teaching. The School also provides a wide range of courses to provisional teachers who wish to qualify for teaching certificates and teachers who wish to renew licenses. Degree programs in adult education, college student development, higher education, human resource development, rehabilitation counseling, therapeutic recreation, and urban recreation administration are offered.

Laboratory and clinical facilities are provided by the University Reading Center and Speech and Hearing Clinic. In cooperation with public and private schools and a wide variety of social agencies, ample opportunity for field experience is provided.

In addition to a full schedule of weekday courses during the academic year, classes are offered in the evening, on Saturday, and during the summer.

HISTORICAL DEVELOPMENT

The University began offering professional courses for teachers in 1904-5, and in 1907 it established a Division of Education. In 1909, the Division of Education became the Teachers College, which in its early years was concerned largely with the teacher preparation on the undergraduate level. In 1928, the Teachers College became the School of Education, and greater provision was made for advanced study. Graduate enrollment has steadily increased, and today the School has a considerably larger number of graduate than undergraduate students.

EDUCATION FOR TEACHERS

Programs are planned to provide a broad general education, adequate mastery of the teaching-field content, and professional competence. The relative em-

*Appointed by the Dean.

phasis placed on each of these depends on the student's teaching-level pl
For example, elementary school teachers, since they teach all subjects, n
preparation of greater breadth and less specialization than secondary sch
teachers.

Adequate preparation for teaching requires an acceptable minimum of f
years of full-time study. Five years terminating in a Master of Arts in Edu
tion degree are needed for superior preparation which will command hig
salaries and opportunities for promotion. During the first two years, the stud
is registered in Columbian College of Arts and Sciences, the liberal arts coll
of the University, where he acquires the background of general education
essential to success as a teacher. Here he is assigned a special adviser fr
the School of Education to assist in planning his program.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES
stated on pages 21-32; other University regulations, on pages 43-50.

ACADEMIC WORK LOAD

UNDERGRADUATE

Fifteen to 17 semester hours of credit constitute a normal program. A stud
with a quality-point index of 3.00 or higher may, with the permission of
Dean, enroll for 18 or 19 hours. No student may enroll for more than
except by permission of the Committee on Scholarship.

A student employed 15 hours or less a week may carry a normal progr
of college work.

A student employed from 16 to 25 hours a week may enroll for 12 or
hours. With a quality-point index of 3.00 or higher he may, with special p
mission of the Dean*, enroll for 14 to 16 hours.

A student employed from 26 to 34 hours a week may enroll for 9 or
hours. With a quality-point index of 3.00 or higher he may, with special p
mission of the Dean* enroll for 11 to 13 hours.

A student employed 35 hours or more a week may enroll for 6 or 7 hou
With a quality-point index of 3.00 or higher he may, with special permiss
of the Dean*, enroll for 9 or 10 hours.

A student who increases his hours of employment after registration or at
time during a semester must report immediately to the Dean so that his p
gram may be adjusted, if necessary.

GRADUATE

Students employed full-time may take a maximum of 6 semester hours.

* Request forms are available at the Office of the Dean. They should be filled out and returned
the Dean at least two weeks prior to Registration.

The Bachelor's Degrees

THE SCHOOL OF EDUCATION OFFERS UNDERGRADUATE PROGRAMS leading to the degrees of Bachelor of Arts in Education and Bachelor of Science in Physical Education.

The program of each student must be approved by a faculty adviser. Since each student's program is defined by his particular needs, it is important that the student have a clear concept of his major interest in education, and also that he be familiar with the teaching-certificate requirements of the locality in which he expects to teach.

ENTRANCE REQUIREMENTS

Bachelor of Arts in Education and *Bachelor of Science in Physical Education.*—The satisfactory completion of the appropriate first two-year curriculum in Columbian College of Arts and Sciences (see pages 76-78), or the equivalent from another accredited educational institution with a quality-point index of at least 2.25 or the equivalent, is required. Applicants must file an application for formal admission to the School of Education. This form may be obtained from the Office of the Dean, the School of Education, George Washington University, Washington, D.C. 20006. In addition to filing an application, out-of-state applicants must provide the School of Education with at least one letter of reference from instructors who know them. Candidates in the pre-education curriculum in Columbian College and residents in the Washington, D.C., metropolitan area must arrange for an interview by calling the Office of the Dean, in addition to filing the application. At the admissions interview, applicants must exhibit personality traits that give promise of success as a teacher. Pre-education majors in Columbian College, who may be admitted tentatively after completing 45 semester hours or fully after completing 60 hours, must also be recommended by their pre-education adviser.

In addition to the regular admissions interview, an interview with the Special Education program adviser is required of applicants interested in Special Education.

REQUIREMENTS FOR THE DEGREES

To be recommended for a degree a student must satisfy the admission, residence, scholarship, and curriculum requirements.

RESIDENCE

Candidates for the Bachelor's degree must complete satisfactorily while in the School of Education a minimum of 30 semester hours.

For full details concerning continuous registration, see pages 46-47.

SCHOLARSHIP

For the system of grading and of computing scholarship, see pages 43-45.

In order to graduate, a student must have a quality-point index of at least 2.25.

Probation.—A student who fails to maintain a quality-point index of at least 2.25 is placed on probation. He remains on probation as long as his index is

below 2.25, or until his probation is removed by the Committee on Scho ship.

Suspension.—A student on probation who fails to raise his index to 2 within the time specified may be suspended.

A student suspended for poor scholarship may, within ten days, appeal case to the Committee on Scholarship through the Dean. If the case appe to be remediable and the student seems likely to improve his scholarship, Committee may readmit him on probation. A student denied readmission m again, after a lapse of a calendar year, petition the Committee through Dean for readmission. A student suspended twice will not be readmitted.

CURRICULUM REQUIREMENTS

In all Bachelor's curricula at least 30 semester hours must consist of cour numbered above 100.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Condition under which the grades of *I* (Incomplete) or *W* (Authorized Wi drawal) may be assigned are described on page 44.

Removing an Incomplete.—Although the grade of *I may* remain on records for a maximum of one year, the instructor should normally set a mu briefer period within which the uncompleted work (usually the final examinat or a required paper) must be made up. The grade of *I* cannot be removed reregistering for the course here, or by taking its equivalent elsewhere. An "I complete" cannot be made up after the lapse of one calendar year except written permission of the Dean's Council. An "Incomplete" which is not moved within one calendar year is automatically changed to an *F*.

CREDIT/NO CREDIT OPTION

A junior or senior student who has a cumulative quality-point index of 2 or better, may, with the approval of his adviser and the Dean, take one cours semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which will recorded on the student's transcript but will not be reflected in his quali point index. No student will be allowed to take more than 4 credit/no cre courses. A student must sign up for such an option at registration. Under circumstances may a student change from credit/no credit status to grad status, or vice versa, after the end of registration. Courses required in student's major field may not be taken on the credit/no credit basis. A tra fer student may not choose this option until the second semester of his enro ment at this University.

BACHELOR OF ARTS IN EDUCATION

The objective of programs leading to the degree of Bachelor of Arts in Educ tion is to provide (1) general educational backgrounds; (2) functional co mand of ideas, concepts, knowledge, and skills in one or more teaching fiel (3) mastery of basic professional information and skills adequate for the beg ning teacher; and (4) development of attitudes needed for success in teachi

The general educational backgrounds needed by prospective teachers are

tained through precollege education, college courses, work experience, leadership activities, student campus activities, and off-campus cultural opportunities.

Normally, from 63 to 66 semester hours of the total requirement are completed in Columbian College of Arts and Sciences of this University or in an equivalent institution elsewhere (see "Education Curriculum," pages 76-77). Since the teaching fields differ in content, scope, and complexity, some programs are longer than others.

Work experience, leadership activities, participation in student campus activities, and *the utilization of off-campus cultural opportunities.*—As part of formal course work and on their own initiative, students of the School of Education are expected to take full advantage of the many opportunities in the Washington area for developing leadership skills. Advisers are available to help students plan these experiences.

NATIONAL TEACHER EXAMINATIONS

All candidates for the degree of Bachelor of Arts in Education are required to take the National Teacher Examinations. Students receive individual reports of test scores and may avail themselves of the regular transcript services of the Educational Testing Service. Students must request the Testing Service to send copies of test scores to the School of Education.

Students required to take the Examinations must register for them with the Educational Testing Service. Application forms are available in the Office of the Dean.

TEACHING-FIELD PREPARATION

Teaching-field preparation depends upon the teaching position for which the student is preparing. Those planning to teach in elementary schools need a degree of competency in several fields. Those preparing to teach in junior or senior high schools must demonstrate competency in a major teaching field. A minor teaching field is optional, but recommended. The student should begin teaching-field preparation while in the first two years in Columbian College.

Teaching-field requirements, developed in cooperation with appropriate departments of the University, include satisfactory completion of prescribed academic courses in one or more fields, a satisfactory score on the special field examination of the National Teacher Examinations*, and satisfactory completion of the prescribed special methods courses.

Prescribed academic courses vary in number in accordance with the scope and complexity of the teaching field and the license requirements of the various states. Minimum academic course requirements for each major teaching field are listed on succeeding pages. Minor teaching-field requirements are somewhat less than those of a major field. Students preparing to teach on the elementary level are advised to use electives to increase their mastery of content in an academic field or an area of specialization.

* Special field examinations of the National Teacher Examinations are available in elementary education; early childhood education; biology and general science; English language and literature; industrial arts; mathematics; chemistry, physics, and general science; social studies; physical education, business education; music education; home economics; and art education.
Students preparing to teach history or geography take the special field examination in social studies.
Students preparing to teach in fields in which special field examinations are not available must obtain a satisfactory score on a special field examination given by the instructor in the special methods course involved.

Art

		Semes Hou
	ART HISTORY	
Art 31–32:	Survey of Western Art, or	
Art 71–72:	Introduction to the Arts in America	
Art:	Two second-group or third-group Art History courses if open to undergraduates	
	FINE ARTS	
Art:	To be selected from the following	
*Art 21–22:	Design I: Basic	
Art 23–24:	Fundamentals of Photography	
Art 41–42:	Drawing I	
Art 51–52:	Ceramics I	
Art 57–58:	Graphics I	
Art 65–66:	Painting I	
Art 81–82:	Sculpture I	
Art 123–24:	Design II: Individual Problems	
Art 125–26:	Painting II	
Art 127–28:	Painting III	
Art 131–32:	Ceramics II	
Art 137:	Workshop in Materials, Methods, and Techniques	
Art 143–44:	Serigraphy	
Art 151–52:	Ceramics III	
Art 153–54:	Graphics II	
Art 157–58:	Graphics III	
Art 163–64:	Design: Visual Communication	
Art 175–76:	Design Projects	
Art 179–80:	Sculpture II	
Art 181–82:	Intermediate Photography	
Art 189–90:	Sculpture III	
	Total	

Biology†

B Sc 11–12:	Introductory Biology for Science Majors	
B Sc 101:	Invertebrate Zoology, or	
B Sc 104:	Comparative Vertebrate Anatomy	
B Sc 108:	Organic Evolution, or	
B Sc 127:	Genetics	
B Sc 140:	General Ecology	
B Sc 163:	Human Physiology	
B Sc 164:	Human Physiology Laboratory	
B Sc:	Advanced Botany courses as approved by the adviser	
Chem 11–12:	General Chemistry	
Phys 1:	General Physics	
Phys 2:	Introduction to Modern Physics	
	Total	45

* Art 21-22 or permission of Department Chairman is prerequisite to all other Fine Arts courses.
† Other courses recommended but not required—Chem 50, or 151-52 and 153-54; Math 31.

Chemistry

		Semester Hours
*Chem 11–12:	General Chemistry, or	
Chem 15–16:	Intensive General and Analytical Chemistry	8
*Chem 22:	Introductory Quantitative Analysis	4
Chem 151–52:	Organic Chemistry	6
Chem 153–54:	Organic Chemistry Laboratory	2
Chem 110:	Introduction to Physical Chemistry, or	
Chem 111:	Physical Chemistry	3
Chem 134:	Descriptive Inorganic Chemistry	2
Chem 191:	History of Chemistry	2
Math 6:	Plane Trigonometry	3
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Phys 1:	General Physics	4
Phys 2:	Introduction to Modern Physics	4
	Total	40–44

Earth Science

B Sc 3:	Introductory Biology for Nonscience Majors	3
Chem 11–12:	General Chemistry	8
Geol 14:	Field Petrology	3
Geol 21–22:	Physical and Evolutionary Geology	6
Geol 101:	History of Geological Sciences	3
Geol 122:	Structural Geology	4
Geol 125:	Marine Geology	3
†Math 3:	College Algebra	3
†Math 6:	Plane Trigonometry	3
Phys 1:	General Physics	4
Other Courses:	To be selected from the following as approved by the adviser	6–8
Anth 186:	Physical Anthropology of Modern Man	
Geol 128:	Geomorphology	
Geol 141:	Introductory Geochemistry	
Geol 147:	Chemical Geology in the Earth and Ocean Sciences	
Geol 151–52:	Invertebrate Paleontology	
Geol 163:	Sedimentation	
	Total	46–48

Elementary Education‡

Art:	As approved by the adviser	3
Econ 1:	Principles of Economics	3
Geog 51:	Introduction to Geography, or	

* Chem 22 required if Chem 11-12 is elected.
† Additional mathematics is required for some advanced geology courses.
‡ Students majoring in Elementary Education may prepare for an additional area of certification by substituting a special sequence of courses in Early Childhood Education or Special Education for elective courses. Courses in these areas are listed, together with the professional courses in Elementary Education, on pages 117-18.

		Sem Ho
Geog 52:	Introduction to Economic Geography	
Hist 71–72:	Introduction to American History	
Math 9, 10:	General Mathematics I, II	
Music:	As approved by the adviser	
PE:	As approved by the adviser	
*Science:	As approved by the adviser	9-
Social Studies:	As approved by the adviser	
	Total	42-

English

Engl 9 or 10:	English Composition: Language as Communication
Engl 11:	English Composition: Language and the Arts and Sciences, or
Engl 12:	English Composition: Language in Literature
Engl 52:	Introduction to English Literature
Engl 71–72:	Introduction to American Literature
Engl 101:	Expository Writing
Engl 115:	Introduction to English Linguistics
Engl 127–28:	Shakespeare
Sp&D 11:	Voice and Diction
†Engl:	To be selected from the following as approved by the adviser
Engl 133–34:	The Romantic Movement
Engl 135–36:	Victorian Literature
Engl 137–38:	The 20th Century
Engl 153–54:	The English Novel
Engl 155–56:	The English Drama
Engl 161–62:	Studies in American Literature
Engl 163–64:	Major American Poets
Engl 165–66:	American Drama
Engl 167–68:	The American Novel
Engl 171–72:	Major American Writers
Engl 173–74:	Selected Literary Movements
Engl 175–76:	Special Topics in American Literature
Engl 177–78:	Contemporary American Literature
	Total

French

Fren 9:	Expression orale du français contemporain, and
Fren 10:	Cours de Syntaxe, or
Fren 12:	French Conversation and Composition (Intensive)
Fren 51–52:	Survey of French Literature, or
Fren 91–92:	Analyse de texte
Fren 103:	Diction, phonétique appliquée
Fren 108:	Cours de grammaire avancée
Fren 109:	La Langue pratique
Fren 110:	Cours de stylistique

* The science requirement must include courses in both physical and biological sciences.
† Not required for the minor teaching field.

		Semester Hours
Fren:	To be selected from the following	18
Fren 119–20:	French Literature of the Middle Ages and the Renaissance	
Fren 121–22:	17th Century French Literature	
Fren 123–24:	18th Century French Literature	
Fren 125–26:	19th Century French Literature	
Fren 127–28:	20th Century French Literature	
Fren 193:	Cours de style	
Other Courses:	Recommended from the following but not required	6
Art 109:	19th Century Art in Europe	
Art 110:	Contemporary Art	
Engl 115:	Introduction to English Linguistics	
Foreign Lang:	Other than French as approved	
Hist 141–42:	History of France	
Psyc 115:	Psychology of Language and Communication	
	Total	42–45

General Science*

B Sc 3–4:	Introductory Biology for Nonscience Majors	6
†Chem 11–12:	General Chemistry, or	
Chem 15–16:	Intensive General and Analytical Chemistry	8
†Chem 22:	Introductory Quantitative Analysis	4
Phys 1:	General Physics and	
Phys 2:	Introduction to Modern Physics, or	
Phys 9–10:	Introduction to Astronomy	6–8
‡Science:	Additional courses as approved by the adviser	10
Math:	To be selected from the following	9
Math 3:	College Algebra	
Math 6:	Plane Trigonometry	
Math 30:	Precalculus	
Math 31:	Calculus of One Variable	
Math 32:	Calculus of Several Variables	
Math 33:	Calculus of Vector Functions	
	Total	41–47

Geography

Geog 51:	Introduction to Geography	3
Geog:	To be selected from the following	21
Geog 125:	Transportation Geography	
Geog 126:	Economic Geography	
Geog 127:	Population and Settlement	
Geog 132:	Resource Management and Conservation	
Geog 133:	Geography of Poverty and Hunger	
Geog 139:	Geographic Perspectives on Current World Problems	
Geog 140:	Urban Geography	
Geog 141:	Urban Settlement	
Geog 142:	Urban Environments and Systems	

* May not be chosen as a minor teaching field.
† If Chem 11-12 is elected, it must be followed by Chem 22. If Chem 15-16 is elected, Chem 22 is not required, however. Chem 50 is recommended following Chem 16.
‡ Eighteen semester hours in one science field are required for certification.

		Semester Hours
Geog 144:	Environmental Adaptation	
Geog 146:	Political Geography	
Geog 161:	Latin America	
	Total	2

German

Germ 9–10:	German Conversation and Composition	
Germ 51–52:	Introduction to German Literature—in English	
Germ 179–80:	Advanced German Conservation and Composition	
*German:	Additional courses as approved by the adviser	
	Total	

History

Hist 39–40:	European Civilization in Its World Context	
Hist 71–72:	Introduction to American History	
Hist:	Research Seminar (see adviser, Department of History)	
Hist:	Six semester hours in each of three of the following groups as approved by the adviser	
*Hist:	Additional semester hours from any one of the following groups as approved by the adviser	
	Total	

GROUP 1: AMERICAN HISTORY

Hist 167:	American Colonial History
Hist 169:	The American Revolution
Hist 170:	U.S. Early National History
Hist 171–72:	U.S. Social History
Hist 173–74:	Afro-American History
Hist 175–76:	U.S. Political History
Hist 177:	The Ante-bellum South
Hist 178:	Recent U.S. History
Hist 179–80:	U.S. Economic History
Hist 181–82:	U.S. Diplomatic History
Hist 183:	Oversea Expansion of the United States
Hist 185:	Women in America
Hist 186:	U.S. Urban History

GROUP 2: EUROPEAN HISTORY

Hist 108:	The Ancient Near East and Egypt to 322 A.D.
Hist 109:	Early Aegean and Greek Civilizations to 338 B.C.
Hist 110:	The Roman World to 337 A.D.
Hist 111–12:	Medieval History
Hist 113:	Early Middle Ages
Hist 121:	The Renaissance in Western Europe
Hist 122:	The Reformation in Western Europe
Hist 131–32:	History of Germany

* Not required for the minor teaching field.

Hist 139–40:	World History in the 20th Century
Hist 141–42:	History of France
Hist 143:	History of Eastern Europe
Hist 144:	History of Russia: Medieval to 1700
Hist 145:	History of Russia: 18th and 19th Centuries
Hist 146:	History of Russia: Soviet Russia
Hist 147:	Economic History of Europe
Hist 149–50:	European Diplomatic History
Hist 151–52:	History of England and Great Britain
Hist 153:	Tudor England
Hist 154:	Stuart England
Hist 157:	20th Century European Diplomatic History
Hist 158:	Modern Jewish History

GROUP 3: THE EASTERN WORLD

Hist 138:	History of World Communism
Hist 144:	History of Russia: Medieval to 1700
Hist 145:	History of Russia: 18th and 19th Centuries
Hist 146:	History of Russia: Soviet Russia
Hist 187:	History of Modern China
Hist 188:	History of Chinese Communism
Hist 189:	History of Modern Japan
Hist 193:	History of the Near East
Hist 194:	History of the Modern Near East
Hist 195–96:	History of East Asia

GROUP 4: LATIN AMERICAN HISTORY

Hist 161:	Revolution in 20th Century Latin America: the Mexican and Cuban Experience
Hist 163–64:	History of Latin America
Hist 165:	History of Brazil
Hist 166:	History of Mexico
P Sc 177:	Governments and Politics in Latin America
P Sc 178:	International Relations of Latin America

Mathematics

		Semester Hours
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Math 32:	Calculus of Several Variables	3
Math 33:	Calculus of Vector Functions	3
Math 121:	Introduction to Abstract Algebra	3
Math 124:	Introduction to Matrix Theory	3
Math 135:	Projective Geometry	3
*Math:	Three additional second- or third-group courses in Mathematics approved by the adviser	9
Stat 97:	Introduction to Computer Programming	3
Stat 157–58:	Introduction to Mathematical Statistics	6
	Total	39

* Not required for the minor teaching field.

Music

Mus 5–6:	Harmony
Mus 103–4:	History of Music
Mus 131–32:	Advanced Theory
Applied Music:	Voice or major instrument
Applied Music:	Minor instruments
Ensemble:	Choral or Orchestral
Music Literature or Music Theory:	As approved by the adviser
	Total

Physics

Math 30:	Precalculus
Math 31:	Calculus of One Variable
Math 32:	Calculus of Several Variables
Math 33:	Calculus of Vector Functions
Phys 31–32:	Introduction to Theoretical Physics
Phys 151:	Intermediate Laboratory
Phys 161:	Mechanics I
Phys 163:	Physical and Quantum Optics
Phys 164:	Thermodynamics
Phys 165:	Electromagnetic Theory
Phys 167:	Principles of Quantum Physics
	Total

Russian

Slav 9–10:	Intermediate Russian Conversation and Composition
Slav 91–92:	Introduction to Russian Literature
Slav 125:	Russian Linguistic Structure
Slav 126:	Contrastive Russian-English Analysis
Slav 141–42:	Russian Romanticism and Realism, or
Slav 151:	Russian Symbolism, and
Slav 152:	Russian Literature after the Revolution
Slav 197:	Methodology of Teaching Russian
*Slav:	Additional courses from the following as approved by the adviser
Slav 101:	Readings in the Soviet Press
Slav 104:	Business Russian
Slav 109–10:	Advanced Russian Conversation and Composition
Slav 128:	Dostoevsky, the Man and the Artist
Slav 143–44:	The Russian Novel
Slav 146:	The Russian Short Story
Slav 153:	Turgenev
Slav 156:	Leo Tolstoy, His Life and Works
Slav 157:	Nabokov
Slav 158:	Solzhenitsyn

* Not required for the minor teaching field.

		Semester Hours
Slav 161–62:	Russian Culture	
Slav 165:	Soviet Literature from the Revolution to World War II	
Slav 166:	Soviet Literature from World War II to the Present	
Slav 193–94:	The Other Slavs: Their Literature—in English	
	Total	36

Social Studies

Econ 1–2:	Principles of Economics	6
Hist 39–40:	European Civilization in Its World Context	6
Hist 71–72:	Introduction to American History	6
P Sc 4 or 5, 6:	Introduction to Political Science	6
Other Courses:	To be selected from the following	6
Anth 1–2:	Introductory Anthropology	
Geog 51:	Introduction to Geography	
Geog 52:	Introduction to Economic Geography	
Soc 1:	Introductory Sociology	
Soc 2:	Uses of Sociology	
*Other Courses:	Second-group courses, as approved by the adviser, from Anthropology, Economics, Geography and Regional Science, History, Political Science, and Sociology	12
	Total	42

Spanish

Span 9–10:	Spanish Conversation and Composition, or	
Span 12:	Spanish Conversation and Composition (Intensive)	6
Span 51–52:	Survey of Spanish Literature and Civilization	6
Span 91–92:	Explicación de textos	6
Span 109–10:	Advanced Spanish Conversation and Composition	6
Span:	Two full-year courses selected from second-group Spanish or Spanish American Literature courses	12
Other Courses:	Recommended from the following	6
Engl 115:	Introduction to English Linguistics	
Foreign Lang:	Other than Spanish as approved	
Hist 161:	Revolution in 20th Century Latin America: the Mexican and Cuban Experience	
Hist 163–64:	History of Latin America	
Hist 165:	History of Brazil	
Hist 166:	History of Mexico	
Psyc 115:	Psychology of Language and Communication	
Span 193:	Curso de estilo	
Span:	Second-group courses in Spanish and Spanish American Literature not previously elected	
	Total	42

* Not required for the minor teaching field.

Speech and Drama

Sp&D 1:	Communicative Speaking and Listening
Sp&D 11:	Voice and Diction
Sp&D 32:	Oral Interpretation of Literature
Sp&D 101:	Bioacoustics
Sp&D 103:	Biophonetics
Sp&D 112:	Advanced Public Speaking
Sp&D 121:	Group Discussion and Conference Leadership
Sp&D 169:	Introduction to Creative Dramatics
Area of Specialization:	Selected from one of the following groups as approved by the adviser
	Total

GROUP 1: SPEECH COMMUNICATION*

Sp&D 126:	Argumentation and Debate
Sp&D 127–28:	Advanced Debate Practice
Sp&D 133:	Broadcasting in America
Sp&D 134:	Radio Production and Performance
Sp&D 143:	Origins of Contemporary Rhetorical Theory
Sp&D 144:	History and Criticism of American Public Address

GROUP 2: DRAMA*

Sp&D 115–16:	Acting
Sp&D 151:	Stagecraft
Sp&D 152:	Advanced Stagecraft
Sp&D 154:	Play Directing
Sp&D 155–56:	Play Production Practice
Sp&D 165–66:	History of the Theatre

PROFESSIONAL EDUCATION

The basic professional information, skills, and attitudes needed by beginning teachers are provided through a sequence of courses to be taken in the junior and senior years. Lectures and class discussions are closely coordinated with field work. Instruction is differentiated to meet the needs of those preparing to teach on the various levels—elementary school, junior high school, senior high school, and adult.

The prescribed courses in special methods are concerned primarily with methods of initiating, guiding, and evaluating learning experiences dealing with the content of teaching fields. They attempt to bring to the student specific suggestions drawn from the accumulated experience of successful teachers. However, in addition, the courses review the teaching-field content currently in use in schools, and examinations at the end of courses provide the final test of competency in the teaching fields.

* Not required for the minor teaching field.

Professional Courses—Secondary

		Semester Hours
Educ 108:	Human Development, Learning, and Teaching	3
Educ 112:	Educational Measurement	3
Educ 123:	Society and the School	3
Educ 131:	Secondary School Principles and Methods	3
Educ 134:	Student Teaching in Secondary Schools	6–9
Special Methods:	Three to six semester hours from the following courses	3–6
Educ 136:	Teaching English in Secondary Schools	
Educ 137:	Teaching Speech	
Educ 138:	Teaching Social Studies in Secondary Schools	
Educ 139:	Teaching Art in Secondary Schools	
Educ 140:	Teaching Mathematics in Secondary Schools	
Educ 142:	Teaching Music in Secondary Schools	
Educ 144:	Teaching Science in Secondary Schools	
Educ 146:	Teaching Foreign Languages	
	Total	21–27

Professional Courses—Elementary

Educ 108:	Human Development, Learning, and Teaching	3
Educ 111:	Elementary School Curriculum and Methods	15
Educ 112:	Educational Measurement	3
Educ 115:	Elementary School Teaching of Reading	3
Educ 123:	Society and the School	3
Educ 135:	Student Teaching in Elementary Schools	9
	Total	36

Students majoring in Elementary Education may prepare for an additional area of certification by substituting a special sequence of courses in Early Childhood Education or Special Education for elective courses.

AREA OF CERTIFICATION IN EARLY CHILDHOOD EDUCATION*

		Semester Hours
Educ 132:	Student Teaching in Early Childhood Schools	6
Educ 150:	Foundations of Early Childhood Education	3
Educ 152:	Early Childhood Curriculum	3
Educ 153:	Role of the Professional in Early Childhood Education	3
Educ 154:	Community Resources and Materials for the Young Child	3
	Total	18

* Students planning to seek certification in Early Childhood Education must check with the adviser during the sophomore year.

AREA OF CERTIFICATION IN SPECIAL EDUCATION*

		Semester Hours
S Ed 101:	Seminar: Dimensions of the Complementary Teaching Role	3
S Ed 102:	Teaching the Child with Special Needs: Methods and Materials	3
S Ed 103:	Teaching the Child with Special Needs: Creative Programming	3
S Ed 170:	Interpersonal/Intrapersonal Relationships for Special Education Teachers	3
S Ed 189:	Preprofessional Internship: Observing the Special Child in the Regular Class Milieu	3
S Ed 190:	Preprofessional Internship: Inspecting a Continuum of Special Education Services	3
S Ed 199:	Internship in Complementary Teaching	6
	Total	24

BACHELOR OF SCIENCE IN PHYSICAL EDUCATION

The curriculum, which is designed to prepare students for teaching in elementary and secondary school programs of physical education, offers opportunities for specialization in dance, elementary or secondary school physical education.

The student wishing to prepare to teach another subject in addition to physical education may use his elective hours to work toward a minor teaching field. Relevant work in Columbian College may be counted.

PREREQUISITE

For the first two years of the Bachelor of Science in Physical Education curriculum, see Columbia College of Arts and Sciences, pages 77-78.

CURRICULUM

Specialization in Dance

Junior and Senior Years

		Semester Hours
Educ 108:	Human Development, Learning, and Teaching	3
Educ 112:	Educational Measurement	3
Educ 123:	Society and the School	3
Educ 134:	Student Teaching in Secondary Schools	6–9
PE 109–10:	Dance Composition	6
PE 117:	Techniques of Teaching Dance	3
PE 135–36:	Dance History	6
PE 141–42:	Dance Production	4
PE 150:	Human Anatomy	3
PE 151:	Kinesiology	3
PE 164:	Physiology of Exercise	3

* S Ed 102, 103, 170, 189, and 190 must be taken prior to the senior year.

		Semester Hours
PE:	Nine semester hours to be selected from the following	9
PE 119:	Creative Dance for Children	
PE 120:	Repertory	
PE 129:	Introduction to Motor Learning	
PE 137:	Dance Notation	
PE 144:	Choreography	
Elective:		5–8
	Total	60

Specialization in Elementary School Physical Education

Junior Year

Educ 108:	Human Development, Learning, and Teaching	3
Educ 123:	Society and the School	3
PE 101:	Physical Education in the Elementary School	3
PE 102:	Movement Education	3
PE 113:	Field Experience: Practicum in Physical Education, Dance, or Recreation	3
PE 130:	Motor Performance in Childhood	3
PE 138:	Physical Education Curriculum and Administration	3
PE 150:	Human Anatomy	3
PE 151:	Kinesiology	3
Elective:		6
	Total	33

Senior Year

Educ 112:	Educational Measurement	3
Educ 135:	Student Teaching in Elementary Schools	9
PE 114:	Field Experience: Practicum in Physical Education, Dance, or Recreation	3
PE 129:	Introduction to Motor Learning	3
PE 164:	Physiology of Exercise	3
Elective:		6
	Total	27

Specialization in Secondary School Physical Education

Junior Year

Educ 108:	Human Development, Learning, and Teaching	3
Educ 123:	Society and the School	3
PE 111–12:	Sports Education Technique	6
PE 113:	Field Experience: Practicum in Physical Education, Dance, or Recreation	3
PE 138:	Physical Education Curriculum and Administration	3
PE 150:	Human Anatomy	3
PE 151:	Kinesiology	3
Elective:		9
	Total	33

Senior Year

		Semester Hours
Educ 112:	Educational Measurement	3
Educ 134:	Student Teaching in Secondary Schools	6–9
PE 114:	Field Experience: Practicum in Physical Education, Dance, or Recreation	3
PE 129:	Introduction to Motor Learning	3
PE 164:	Physiology of Exercise	3
Elective:		9
	Total	27–30

Graduate Study

THE SCHOOL OF EDUCATION OFFERS GRADUATE PROGRAMS leading to the degrees of Master of Arts in Teaching, Master of Arts in Education, Education Specialist, and Doctor of Education.

GRADES

For graduate work, grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit. Grades *A*, *B*, *C*, and *F* are counted in computing the quality-point index (see page 44).

Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work of the course. An "Incomplete" cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council. An "Incomplete" which is not removed within one calendar year is automatically changed to an *F*. An "Incomplete" cannot be removed by reregistering for the course.

THE DEGREE OF MASTER OF ARTS IN TEACHING

The School of Education offers two intensive fifth-year programs. The program in elementary education is designed to prepare selected graduates of liberal arts colleges for teaching in elementary schools; the program in museum education is interdisciplinary and is designed to prepare selected liberal arts graduates, postgraduates, and professionals for education work in a museum or for liaison work between museums and school systems. Successful fulfillment of the requirements of the first program noted provides the professional courses necessary for certification as an elementary teacher. Students may receive the degree of Master of Arts in Teaching on completion of either program or, in the elementary education program, may receive credit for 15 semester hours of graduate work toward the degree of Master of Arts in Education.

For details write the Chairman of the Department of Education, M.A.T. Program, School of Education, George Washington University, Washington, D.C. 20006.

ADMISSION TO THE PROGRAMS

To be admitted as a student-intern in the elementary education program, an applicant must (1) have a Bachelor's degree from an accredited liberal arts institution, including courses related to the general education requirements for teacher certification; (2) show evidence of interest in children and a sincere desire to teach; (3) submit three written references attesting to quality of academic record and personality; (4) submit a score on the Aptitude Test of the Graduate Record Examination or the Miller Analogies Test; and (5) be interviewed by the University Selection Committee or make alternative arrangements specified by the Committee and approved by the Dean of the School of Education.

To be admitted to the program in museum education an applicant must (1) have a Bachelor's degree from an accredited institution; (2) submit three written references attesting to quality of academic record and work experience; and (3) be interviewed by the University Selection Committee or make alternative arrangements specified by the Committee and approved by the Dean of the School of Education. Considered essential are skills in communication, a desire to study and learn from the artifacts of nature and civilization, and an ability for and interest in working with people. Evidence of strong undergraduate, graduate, or professional experience in such fields as American history, geology, art, or the social sciences will be considered favorably.

PLAN OF STUDY FOR THE ELEMENTARY EDUCATION PROGRAM

Beginning with a six-week summer session, the program includes a September experience with full-time study in the fall semester. Course work during this time is planned to help each student gain understanding of (1) the characteristics of elementary school children, (2) the subject-matter areas of the elementary school curriculum, (3) basic dimensions of teaching methodology, (4) the relationship between educational theory and methods, (5) educational tests and measurements, and (6) the role of the school in American society.

During the fall semester, students will be given full-time student teaching assignments in a nearby public school. This part of the program will permit the student to use, in an actual teaching situation, the educational theories and methods which he has been studying.

An internship during the spring semester in one of the cooperating school systems in the area may provide the student an opportunity to assume the responsibilities of a beginning teacher, with the help and guidance of University and public school staff members. Seminar meetings will be scheduled weekly for discussion of common problems and for cooperatively planned work on individual and group needs of interns. Each student plans, conducts, and reports on an action research project.

PLAN OF STUDY FOR THE MUSEUM EDUCATION PROGRAM

The program begins with a six-week summer session. Emphasis in the course work will be on the study of museums and the understanding of groups served. During the fall semester students will study the school as an institution —its organization, pupil population, staff, services—and as a laboratory where they will work in classrooms with students and teachers. Emphasis will also focus on communication skills and interpersonal relations through a study of

techniques for successful communication, barriers to communication, language use and the search for meaning. Students will also earn at least 12 semester hours of credit throughout the year in a special field, e.g., anthropology, American civilization, fine arts, zoology, or any content appropriate to education in a museum.

During the spring semester students will have an internship field work experience in area science, art, and history museums. They will also have an on-campus seminar covering museum education issues such as (1) the museum visit—programs for groups and individuals; (2) new communication techniques and media; (3) exhibitions—practical consideration of exhibition design based on education research, and practical consideration of installation and traveling exhibition procedures; and (4) evaluation and research—identifying research problems for museum education, such as how to measure audience reaction.

THE DEGREE OF MASTER OF ARTS IN EDUCATION

Programs of study leading to the degree of Master of Arts in Education are designed to enable prospective teachers and teachers of experience to increase their knowledge of professional and academic information and skills and prepare for special types of educational service. They also provide opportunities for college graduates in other disciplines to acquire needed professional education, as well as study in the subjects which they are planning to teach.

From the various related departments of the University, the student and his adviser select courses to give the student an adequate background in his chosen field of service. Programs for teachers-in-service and experienced teachers planning to re-enter the profession are differentiated from those for students without teaching experience.

Master's programs are available in the following fields:

Adult Education
College Student Development
Curriculum
Early Childhood Education
Elementary Administration
Elementary Education
Guidance
Higher Education
Human Resource Development
Physical Education and Recreation (candidates may specialize in adaptive physical education, dance, elementary or secondary school physical education, therapeutic recreation, tourism development, or urban recreation and parks)
Reading
Rehabilitation Counseling
Secondary Administration
Secondary Education
Special Education (candidates may specialize in crisis-resource teaching, diagnostic-prescriptive teaching, or early childhood special education)
Supervision and Human Relations

For teachers interested in developing or strengthening their academic competence, the elementary and secondary education fields normally permit 15 to 18 semester hours of work in departments other than education. These programs are designed to meet the needs of teachers-in-service who need additional work in content to qualify for advanced certification or to improve their

classroom skills; and may also be helpful to previously trained teachers planning to re-enter the profession. The major emphasis is upon strengthening both the academic and professional competencies of the teacher.

Additional information concerning these programs may be obtained by writing or telephoning the Office of the Dean.

ENTRANCE REQUIREMENTS

A Bachelor's degree from an accredited institution, an undergraduate quality-point index of 2.50 or above ($C+$ average), demonstrated interest in teaching, and personality traits that give promise of success as a teacher, are required. In a number of programs there are more applicants than can be accepted; therefore, selections by additional criteria are necessary.

Two years of successful teaching are required before admission to candidacy in the field of school administration. Experience is required for admission to programs in adult education and human resource development.

ADMISSION TO CANDIDACY

Candidates whose undergraduate preparation does not include equivalents of the basic requirements for the degree of Bachelor of Arts in Education must make up deficiencies and may be required to take designated tests.

ADVANCED STANDING

For the record, advanced standing is granted for approved courses taken at other accredited institutions, but a minimum of 30 semester hours must be completed at this University as a Master's candidate.

A maximum of 12 semester hours of advanced courses completed in this University in excess of the requirements for the Bachelor's degree may be credited toward the Master's degree if the work fits in with the student's plan of specialization.

Advanced standing is not granted for work completed five or more years before application for admission or readmission to Master's candidacy.

REQUIREMENTS FOR THE DEGREE

PLAN OF STUDY

The plan of study leading to the degree of Master of Arts in Education requires a minimum of 33 hours of graduate credit. The plan may, at the student's option, include a thesis carrying 6 hours of graduate credit. Whether or not a student selects the thesis option, a minimum of 18 hours, including a course in educational research methods and procedures, must be from courses planned primarily for graduate students (third-group courses). A minimum of 12 hours, not including the thesis or the research course, must be from courses offered by the School of Education.

Programs may include additional teaching-field preparation. In such cases, however, undergraduate and graduate courses combined must be at least equivalent to the undergraduate requirements for the degree of Bachelor of Arts in Education (see pages 106-18).

Programs are planned initially in conference with an admission adviser in the Office of the School of Education and subsequently with a designated adviser in the candidate's area of specialization. These programs are based on the interests of the candidate, his previous background, and the certification requirements of the state and locality in which the candidate plans to teach.

All degree requirements must be completed within a period of six years.

RESIDENCE

A candidate for the Master's degree is required to complete satisfactorily 30 semester hours in residence in the School. With the approval of the adviser, 9 of the 30 hours may be off-campus courses in the College of General Studies.

SCHOLARSHIP

A quality-point index of 3.00 is required for graduation. Students who receive the grade of *C* in more than 6 semester hours are subject to suspension. Students who receive a grade of *F* must confer with the Dean of the School of Education before enrollment for further work.

THE THESIS

The choice of the thesis subject must be approved in writing by the student's adviser and filed in the Office of the Dean. A statement of the School of Education standards for the thesis and printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, an additional calendar year may be granted without further tuition payment. The student must, however, maintain continuous registration (see pages 46-47) during this period. If the preparation of the thesis extends beyond the additional calendar year, the student must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to the course examinations, the candidate must pass a special three-hour examination on his area of specialization. Candidates for the examination must be registered for the semester it is to be taken, and must file a written application in the Office of the School of Education no later than thirty days prior to the date of the examination.

THE DEGREE OF EDUCATION SPECIALIST

The School of Education provides a program of advanced study leading to the degree of Education Specialist for students with Master's degrees in Education who seek further professional preparation for specific objectives.

Education Specialist programs are available in the following fields:

Administration
Adult Education
Curriculum
Counselor Education
Elementary Administration
Higher Education
Secondary Administration

ENTRANCE REQUIREMENTS

The degree of Master of Arts in Education from this University (or the equivalent), a satisfactory score on the Miller Analogies Test or the Graduate Record Examination, and two years of successful pertinent experience, are required.

ADMISSION TO CANDIDACY

Each applicant must be interviewed and recommended by a staff member of the School of Education or by a representative in the candidate's locality appointed by the Dean.

SCHOLARSHIP

Scholarship requirements for the degree of Education Specialist are the same as those for the degree of Master of Arts in Education (see page 124).

PROGRAMS OF STUDY AND DEGREE REQUIREMENTS

Individual programs are developed, through the faculty-adviser plan, to fit the candidates' abilities, interests, needs, and career goals. A minimum of 30 semester hours beyond the requirements of the degree of Master of Arts in Education at this University is required. At least 21 hours of this work must be taken on campus at this University; with the approval of the adviser, the remaining semester hours of the program may be taken in off-campus offerings of the College of General Studies or at another approved university. A maximum of five calendar years is allowed for completion of the program.

At least 12 of the required 30 hours must be in appropriate graduate courses in Education selected from the following areas: (1) foundations and cognate study, (2) background and general principles of the field of study, (3) an area of specialization.

THE COMPREHENSIVE EXAMINATION

Successful completion of a six-hour written examination and/or an oral examination, at the option of the major field adviser, is required.

THE DEGREE OF DOCTOR OF EDUCATION

The School of Education offers programs of advanced study leading to the degree of Doctor of Education. These programs, which are under the supervision of the Advanced Graduate Faculty, provide major fields of study in teacher education, special education, counselor education, administration and curriculum, adult education, and higher education. Supporting fields are avail-

able in administration, administration of higher education, adult education, college student development, counselor education, curriculum, elementary education, higher education, human growth and development, human resource development, reading, secondary education, special education, supervision, and teacher education. With the approval of the Advanced Graduate Faculty and the departments concerned, one supporting field may be taken in other departments of the University. All programs require study of interrelated areas of education and a doctoral dissertation in the major field of study.

ADMISSION

The applicant must have adequate preparation for advanced study, including graduate work in fields prerequisite to his objective equivalent to that required for the degree of Master of Arts in Education at this University, at least three years of successful pertinent educational experience, acceptable personal qualities, and a capacity for creative scholarship and effective leadership.

The applicant first arranges for an interview with the Assistant Dean for advanced graduate studies to explore his needs in relation to the resources of the School and to guide him in his application for doctoral study. The required admission procedures and standards will be explained at this time. Candidates meeting the initial standards are admitted to precandidacy for the degree.

PRECANDIDACY

In the precandidacy period a minimum of 9 semester hours of course work in the program, including requirements specified by the Advanced Graduate Faculty, must be completed. Application for full candidacy will then be decided on the basis of the quality of scholarship in the precandidacy period, the recommendations of instructors, a detailed plan for the balance of the program, and a qualifying examination.

PLAN OF STUDY

In general, from two to three years of full-time study beyond the degree of Master of Arts in Education, or the equivalent in part-time study, are required. Programs are individually planned. It is estimated that, for the average student, the work required for the total program will be 75 semester hours, including a minimum of 12 semester hours of dissertation research.

Each program is divided into two parts. The first consists of preparation for comprehensive examinations in a major field of study and two supporting fields, and completion of a required research tool field. The second is composed of research investigation, the writing of a dissertation, and the final oral examination.

Students who have completed the comprehensive examinations and who were not registered for doctoral study under the payment plan in effect prior to July 1, 1967, must register for a minimum of 6 semester hours of Dissertation Research (491) a semester until 12 hours have been completed, and a minimum of 3 semester hours a semester thereafter until the satisfactory completion of the final examination.

COMPREHENSIVE EXAMINATIONS

When the student is admitted to doctoral candidacy, he is assigned to a committee, each member of which is responsible for guiding him in his preparation for one of the required comprehensive examinations in supporting fields or the comprehensive major field examination. The candidate must arrange individual conferences with the committee members to determine the content of each field and to receive guidance in his preparation for the examination.

The supporting field examinations, which are taken first, are three-hour written examinations. In addition to the research tool field a student who plans a historical research investigation for his dissertation must complete an appropriate research seminar offered by the Department of History. The student's Dissertation Committee may recommend other tool requirements. The tool requirement must be completed prior to the major field examination. The major field examination is a written twelve-hour examination, six hours on each of two successive days.

The candidate begins the second part of his program after the satisfactory completion of all supporting field examinations, the required research tool field, and the major field examination.

THE DISSERTATION

A dissertation is required as evidence of ability to perform scholarly research and to interpret and present its results.

During the first part of the program, the Dean appoints a Dissertation Committee, consisting of a major adviser as Director, usually the major field adviser, and two additional faculty members who serve as readers. The candidate is required to submit a proposal for his dissertation to this Committee, which determines its acceptability and recommends approval to the Committee on Advanced Graduate Studies. The dissertation is completed under the direction of the Dissertation Committee.

No later than the date specified in the calendar, the candidate must submit to the Dean three complete copies of the dissertation and two copies of an abstract for inclusion in the announcement of the examination and for reproduction by University Microfilms, Inc. Printed copies of detailed regulations regarding the form and reproduction of the dissertation, preparation of the abstract, and services offered by University Microfilms, Inc., are available in the Office of the Dean. The successful candidate for the doctorate is required, before receiving his degree, to pay a fee to cover the expense of printing the Announcement of the Final Examination, and for the basic service rendered by University Microfilms, Inc.

THE FINAL EXAMINATION

When the dissertation has been accepted, the Director recommends the candidate to the Dean for the final oral examination, which must be passed at least three weeks before the degree is to be conferred. The examination is open to the public and is conducted by a committee of the Faculty, appointed by the Dean, supplemented by at least two leaders in the candidate's field of study from outside the University. Candidates who successfully pass the oral examination are recommended for the degree by the Faculty of the School of Education.

RESIDENCE AND CONTINUOUS STUDY

All the preparation for the degree, including examinations, courses, seminars, and other work done under the direction of an adviser, must be done in residence. The student must remain registered in the School of Education, except when the Dean or the Advanced Graduate Faculty has granted a leave of absence. Failure to register each semester of the academic year may result in lapse of candidacy. Subsequent readmission is subject to whatever new conditions and regulations have been established by the Advanced Graduate Faculty.

The supporting and major field examinations must be completed within five years of the date of admission, and the entire program must be completed within eight years, regardless of full-time or part-time study. All candidates must satisfy one of three options for full-time study. Information concerning these plans will be provided by the Assistant Dean for advanced graduate studies upon request by the candidate.

Special Programs and Services

EDUCATION OF TEACHERS OF EXCEPTIONAL CHILDREN

THE SCHOOL OF EDUCATION offers a program for the education of teachers of exceptional children. Laboratory experiences are arranged in schools for handicapped children in the metropolitan area. Students are accepted at the junior- or senior-year undergraduate, Master's, Education Specialist, and Doctoral levels. By special permission, teachers, school administrators, and adequately prepared students from other schools and colleges of the University may elect these courses.

Inquiries concerning the program and the availability of scholarships and fellowships should be directed to Dr. Perry Botwin, Department of Special Education, George Washington University, Washington, D.C. 20006.

GRADUATE PROGRAM IN REHABILITATION COUNSELING

The School of Education offers a federally funded Master's degree program for the preparation of rehabilitation counselors. These professional personnel assist persons who are disabled or disadvantaged to assume a proper place in society. The two-year program combines fieldwork with course work in preparing students for immediate employment in an expanding field that yields high humanitarian and financial rewards. Both the profession and the program are interdisciplinary, drawing upon such related areas as guidance, medicine, psychology, social work, sociology, and special education.

Traineeships, including tuition and stipends, are available for full-time students. Information and applications are available from Dr. Daniel Sinick, Rehabilitation Counselor Education, Department of Education, George Washington University, Washington, D.C. 20006.

GRADUATE SPECIALIZATION IN THERAPEUTIC RECREATION AND ADAPTIVE PHYSICAL EDUCATION

The School of Education offers a federally funded Master's degree program in the field of physical education with a specialization in therapeutic recreation or adaptive physical education. This program is funded by the Bureau of Education for the Handicapped, U.S. Office of Education. Both programs require an intensive internship (minimum of 510 clock hours) in University affiliated training centers in Washington area hospitals, schools, clinics, and public agencies. Inquiries concerning this program and the availability of graduate research assistantships and internships should be directed to Dr. Donald E. Hawkins, Department of Physical Education, Health, and Recreation, George Washington University, Washington, D.C. 20006.

CERTIFICATION CURRICULA

The School of Education provides individually planned programs for liberal arts graduates with appropriate degrees who wish to prepare for teaching. Those seeking certification, but not wishing to work for a degree, may enroll in a certification program if they meet the admission, scholarship, and personality requirements of degree candidates. The School also provides a wide range of courses of interest to teachers who wish to renew licenses.

READING CENTER

(See page 51)

OFF-CAMPUS DEGREE PROGRAMS

The School of Education has academic jurisdiction over the off-campus programs leading to the degree of Master of Arts in Education in the fields of elementary administration; elementary education; higher education; human resource development; secondary administration; secondary education; special education—crisis-resource teaching, diagnostic-prescriptive teaching, early childhood special education; and supervision and human relations.

These degree programs are administered by the College of General Studies. For details concerning the off-campus programs see the *College of General Studies* Catalogue.

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

Dean Peter B. Vaill
Associate Dean R.L. Holland
Assistant Dean John Lobuts, Jr.

FACULTY*

Professors Frederick Amling, Guy Black, Louis Block (*Visiting*), H.F. Bright, D.S. Brown, J.C. Dockeray, R.B. Eastin, R.F. Ericson, Leon Gintzig, P.D. Grub, J.L. Jessup, E.J.B. Lewis, G.L. Lippitt, A.J. Mastro, D.C. McGrath, Jr., H.R. Page, D.D. Roman, R.C. Sedwick, Edwin Timbers, Peter B. Vaill, R.H. Walther (*Research*), M.M. Wofsey

Associate Professors R.A. Barrett, R.R. Bonato (*Research*), J.H.H. Carrington, S.R. Chitwood, K.J. Darr, M.C. Devolites, S.F. Divita, Rodney Eldridge, S.S. Fuller, M.G. Gallagher, Sherwin Greene, W.W. Hardgrave, M.M. Harmon, Jerry Harvey, R.L. Holland, F.C. Kurtz, G.P. Lauter, Norma Loeser, E.R. Magruder, J.F. McCarthy, Jr., C.R. Miller, G.E. Morris, Chei-Min Paik, P.N. Reeves, J.R. Roman, Jr., T.E. Shaughnessy, S.N. Sherman, W.E. Smith, E.K. Winslow

Adjunct Associate Professors P.S. Birnbaum, H.C. Demoody

Assistant Professors Elizabeth Adams, B.L. Catron, Elizabeth Cox, J.P. Coyne, R.S. Coyner, Jr., Irwin Dubinsky, R.F. Dyer, W.H. Guy (*Research*), John Lobuts, Jr., D.B. Rasmussen, R.G. Shouldice, J.W. Waldrip, K.C. Yang (*Research*)

Adjunct Assistant Professors W.J. Auton, J.D. Bentley, W.J. Green, Jr., W.J. Landen, R.L. White

Instructors D.F. Bergwall, Patricia Cleary (*Research*), S.E. Girton, Richard Switalski (*Research*)

Adjunct Instructors T.J. Delaney, G.R. DeLisle, S.T. Fisher, R.B. Hinds, N.G. Oglesby

COMMITTEES†

DEAN'S COUNCIL

B.L. Catron, M.C. Devolites, R.F. Dyer, S.S. Fuller, M.G. Gallagher, G.L. Lippitt, Peter B. Vaill

COMMITTEE ON CURRICULUM

R.L. Holland (*Chairman*), Frederick Amling, S.R. Chitwood, H.C. Demoody, Sherwin Greene, Chei-Min Paik, P.N. Reeves

* The President of the University, the Vice President for Academic Affairs, the Registrar of the University, the Director of Admissions of the University, and the University Librarian are ex officio members of the Faculty of the School of Government and Business Administration.
† The Dean of the School is an ex officio member of all committees.

COMMITTEE ON DOCTORAL STUDIES IN BUSINESS ADMINISTRATION AND PUBLIC ADMINISTRATION

M.M. Wofsey (*Chairman*), D.S. Brown, S.F. Divita, S.S. Fuller, Leon Gintzig, Jerry Harvey, A.J. Mastro

ADVISORY COUNCIL*

The School of Government and Business Administration Advisory Council operates as an advisory group on policy, finance, and community relations. It consists of responsible members of the business and government communities, and of the faculty, administrators, and students of the School.

CHAIRMAN

Leo M. Bernstein, *President, District of Columbia National Bank*

MEMBERS OF THE COUNCIL

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Charles Emory Phillips (*Chairman of the University's Board of Trustees*), *Chairman of the Board, Equitable Life Insurance Company, Washington, D.C.*
Daniel David Roman, *Professor of Management Science*
Maurice H. Schwartz, *Director, Division of Management Information and Telecommunication Systems, U.S. Atomic Energy Commission*
Douglas R. Smith, (*University Trustee*), *President, National Savings & Trust Company, Washington, D.C.*

* The President of the University, the Chairman of the Board of Trustees, the Vice President for Academic Affairs, the Vice President for Development, and the Dean of the School of Government and Business Administration are ex officio members of the Council.

Joseph H. Taggart, formerly *Dean, Graduate School of Business Administration, New York University*
Robert P. Thome, *Comptroller, The Washington Post Company, Washington, D.C.*
Robert L. Tull, *Vice President, Security Storage Company, Washington, D.C.*
James Otis Wright (*University Trustee*), *Corporate Director, Sea Island, Ga.*

INTRODUCTION

This School was organized as the School of Government in 1928. During the next two decades, programs in business administration and public administration were added, and the emphasis gradually shifted from undergraduate to graduate study. The name was changed in 1960 to the School of Government, Business, and International Affairs to reflect more accurately the offerings of the School. A division of the School was effected in 1966, and two schools were established—the School of Government and Business Administration, a primarily professionally-oriented school; and the School of Public and International Affairs, a primarily policy-oriented school.

OBJECTIVES

The principal objective of the School of Government and Business Administration is to prepare its graduates for positions in the management of complex organizations in both business and government. The degree programs are designed to prepare students both for *entrance* into business and government and for *advancement* to high-level management positions.

Programs in the School include examination of administrative principles and quantitative approaches to decision-making common to both business and government. These programs stress the points at which major policy decisions of either business or government must give consideration to related policy decisions of the other. Emphasis is placed on the fact that management education is not limited to organizational techniques but is, in the broadest sense, education for management responsibility.

It is the policy of the School to emphasize a broad fundamental education as the best preparation for positions carrying management or administrative responsibility.

Undergraduate programs concentrate the first two years in a broad liberal arts curriculum drawn from the social sciences, humanities, quantitative methods, and a limited number of courses in administration. Students in the junior and senior years expand their work to include (1) the functions of business enterprise, (2) the economic and legal environment of business, (3) the implications of modern analytical techniques based on quantitative methods, (4) the study of organization theory and human relations, and (5) the practice of problem-solving techniques.

Graduate programs develop the elements common to all management positions regardless of the nature of the operation. Master's degree programs are based on study of the principles of management, human relations, and problem-solving plus an area of specialization.

Responsive to the needs of the Washington community, the School has followed the policy of making many of its educational activities available in off-

campus centers in and around the metropolitan area of Washington. The off-campus work leads to a degree carrying a different designation; thus, the Bachelor of Business Administration degree on campus has a substantial equivalence to the Bachelor of Science in Administration degree offered off campus in facilities furnished by government or business organizations. The School is offering a Bachelor of Science in Health Care Administration degree, at this time limited to students at the Naval School of Hospital Administration, Bethesda, Md. The Master of Arts in Health Care Administration, Master of Business Administration, Master of Public Administration, Master of Urban and Regional Planning, and Master of Arts in Government degrees are offered on campus, while the Master of Science in Administration degree is the only graduate degree offered off campus. The off-campus programs have strong support in the area and provide significant contact with the business and government communities. Programs of study leading to the degrees of Bachelor of Science in Administration and Master of Science in Administration are listed in the *College of General Studies* Catalogue.

COMMON BODY OF KNOWLEDGE

Programs leading to the degrees of Bachelor of Business Administration, Bachelor of Science in Administration, Master of Business Administration, and Master of Science in Administration include the equivalent of at least one year of work in the following areas:

1. In the case of business enterprise, a background of the concepts, processes, and institutions in marketing and distribution, production, and financing functions; in the case of governmental administration, a background of concepts, processes, and institutions of planning, programming, budgeting, personnel practices, and policy formulation in government.

2. A background of the economic and legal environment of business and government enterprise, along with consideration of the social and political influences on business.

3. A basic understanding of the concepts and methods of accounting, quantitative methods, and information systems.

4. A study of organization theory, interpersonal relationships, control and motivation systems, and communications.

5. A study of administrative processes under conditions of uncertainty, including the integration of analysis and policy determination at the over-all management level.

ACADEMIC STATUS

The School of Government and Business Administration has maintained full membership in the Middle Atlantic Association of Colleges of Business Administration since 1961. It joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of the American Assembly of Collegiate Schools of Business. The programs in Public Accounting designed to prepare students for Certified Public Accountants examinations have been approved by the state boards of New York and Maryland. The program in Hospital Administration is accredited by the National Accrediting Commission on Graduate Education for Hospital Administration.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *are stated on pages 21-32; other University regulations, on pages 43-50.*

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. A student may be dropped from any course for undue absence.

The student is held responsible for all the work of the courses in which he is registered, and all absences must be excused by the instructor in charge before provision is made for him to make up the work missed.

A student suspended for any cause may not attend classes during the period of suspension.

WITHDRAWAL

Withdrawal from a course or from the University without academic penalty is permitted during the first four weeks after registration for the fall or spring semester. Withdrawal after this period is permitted only in unusual circumstances, and requires certification by the instructors of courses for which the student is registered that he is doing passing work (see "Withdrawal," page 45).

ADDING COURSES

Courses may not be added after the first full week of classes in any semester or summer session.

INDEPENDENT STUDY PLAN

A student of *demonstrated capacity*, with a special interest in the subject matter of a course, may be permitted to undertake study under the personal direction of an instructor, in accordance with the rules of the appropriate department. Credit under this plan is limited to the specific course credits normally allowed when taken on a class basis.

The Bachelor of Business Administration Degree

THE SCHOOL OFFERS PROGRAMS leading to the degree of Bachelor of Business Administration in the fields of Accounting and Business Administration.

ENTRANCE REQUIREMENTS

Good character and an academic background appropriate for the program of studies contemplated are required.

Requirements for admission to the freshman class are as follows:

1. An acceptable certificate of graduation from an accredited secondary

school, showing at least fifteen units* which must include four years of English; at least two years of one foreign language; two years of science, preferably with laboratory instruction; two years of social studies, one of which must be American history; and two years of college preparatory mathematics.

2. The principal's statement that the applicant is prepared to undertake college work.

3. College Entrance Examination Board scores submitted on the Scholastic Aptitude Test and the English Composition Achievement Test.

It is recommended that the examinations be taken in December or January. Scores on tests taken in the junior year may be submitted. Arrangements for tests are the responsibility of the applicant and should be made with the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947 Center Street, Berkeley, Calif. 94704, not less than one month before the date of the test. In applying for the test, the applicant should specify that the scores be sent to the Office of Admissions, George Washington University, Washington, D.C. 20006.

The College Entrance Examination Board tests are preferred; however, the American College Testing battery scores will be accepted. The applicant should request that these scores be sent to the Office of Admissions directly from the American College Testing Program, Iowa City, Iowa. It is recommended that the applicant take the tests in October of the senior year.

The School of Government and Business Administration will consider the adequacy of the qualifications of an applicant who, because of unusual circumstances, does not present all of the formal requirements stated above. The School may prescribe appropriate scholastic-aptitude tests of the University.

Students transferring from other colleges and universities as juniors must offer an acceptable broad-based liberal arts program or equivalent. However, in no case will more than 60 semester hours of advanced standing be granted for course work completed at community or junior colleges. Accounting and Business Administration courses taken at such colleges may be applied toward the Bachelor of Business Administration degree provided they are comparable to this School's courses numbered *under* 100. Courses comparable to B Ad 161, Mgt 118, 119, or Stat 97 may also be applied. Other courses (one course per area up to a maximum of three courses), comparable to this School's courses numbered 101-200, taken at an accredited community or junior college where a grade of *C* or better has been earned may be accepted to waive certain required courses; however, the waiver of a required course does not entitle the student to any semester hours of credit toward the total 60 semester hours required for the junior and senior years.

REQUIREMENTS FOR THE DEGREE

ACADEMIC WORK LOAD

A full-time student not on probation may not ordinarily take more than 15 semester hours. A student employed more than 24 hours a week, who is not on probation, may not take more than 9 semester hours.

* A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

A full-time student whose quality-point index is 3.50 or higher may take up to 18 semester hours. A student employed more than 24 hours a week, whose index is 3.50 or higher, may take up to 12 semester hours.

A student who accepts employment after registration or at any time during a semester must report immediately to the Dean, so that his program may be adjusted if necessary.

Exception to these rules will require the approval of the Dean.

An undergraduate student on probation may take no more than 12 semester hours of course work.

SCHOLARSHIP

In order to graduate, a student must have the following: (1) a general quality-point index of at least 2.00 and (2) an index in his major of at least 2.50. The major includes the required courses and courses taken in the group options.

DEAN'S HONOR LIST

The names of students who achieve a quality-point index of 3.50 or higher are placed on the Dean's Honor List for that semester. Appearance on the list will be limited to (1) full-time students registered for a minimum of 12 semester hours and (2) part-time students registered for a minimum of 12 semester hours over a period of two consecutive semesters, which may include a summer term.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on page 44.

Removing an Incomplete.—The grade of *I* must be removed no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the Dean, or the appropriate committee, for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

PROBATION

A student whose quality-point index falls below 2.00 after completing a minimum of 12 semester hours of study will be placed on probation. This probation extends over the period in which the student attempts 12 semester hours of work, which may include remedial studies as prescribed.

SUSPENSION

A student whose quality-point index is 1.50 or below or whose index remains below 2.00 at the end of his probationary period may be suspended. A student suspended for poor scholarship may apply for readmission after the lapse of either the fall or spring semester. To be considered for readmission, he must

pass prescribed tests and submit evidence to the Dean's Council that during his absence from the University he has so conducted himself as to indicate that he will profit by readmission. A student readmitted after suspension is on probation and must maintain a current quality-point index of at least 2.50 on each 12 semester hours of work undertaken until his cumulative index is 2.00. In no case will the probationary period after readmission exceed 24 hours of study. A student suspended twice for poor scholarship will not be readmitted.

CREDIT/NO CREDIT OPTION

A junior or senior student who has a cumulative quality-point index of 2.50 or better, may, with the approval of his adviser and the Dean, take one course a semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which will be recorded on the student's transcript but will not be reflected in his quality-point index. No student will be allowed to take more than 4 credit/no credit courses. A student must sign up for such an option at registration. Under no circumstances may a student change from credit/no credit status to graded status, or vice versa, after the end of registration. Courses required in the student's major field may not be taken on the credit/no credit basis. A transfer student may not choose this option until the second semester of his enrollment in this University.

RESIDENCE

A minimum of 30 semester hours, including at least 12 hours in the major field, must be completed while registered in the School of Government and Business Administration. This requirement applies to students transferring within the University as well as to students transferring from other institutions. Summer work may be counted toward the residence requirement, but in no case may the period of residence aggregate less than thirty weeks. Unless special permission is granted by the Dean to pursue work elsewhere, the work of the senior or final year must be completed in the School of Government and Business Administration.

USE OF CORRECT ENGLISH

Any student whose written or spoken English in any course is unsatisfactory may be reported by the instructor to the Dean. The Dean may assign supplementary work, without academic credit, varying in amount with the needs of the student. If the work prescribed is equivalent to a course, the regular tuition fee is charged. The granting of a degree may be delayed for failure to make up such deficiency in English to the satisfaction of the Dean.

CORRESPONDENCE AND HOME-STUDY COURSES

Credit for correspondence or home-study courses is not acceptable and cannot be applied toward a degree.

EARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

A student may earn credit up to a maximum of 30 semester hours or waive curricular requirements by performing satisfactorily on the following tests:

College-Level Examination Program (CLEP).—CLEP offers two types of examinations: (1) CLEP Subject Examinations are offered in 29 subject areas. These tests measure achievement in the equivalent of specific college-level courses. (Credit may not be earned by passing the examination after having taken the equivalent course.) CLEP examinations in Introductory Accounting, Introduction to Business, Commercial Law, and Data Processing are limited to 3 credits each of advanced standing. All other CLEP examinations in Accounting and Business Administration (School of Government and Business Administration courses) are not accepted for advanced standing. (2) CLEP General Examinations—offered in five areas: Mathematics, Social Sciences, Humanities, the Natural Sciences, and English Composition. (Credit—advanced standing—is not given for the General Test in English Composition.) To be eligible to take the CLEP General Examinations, a student must have been out of secondary school for three years or more, and he must not have been enrolled in any regular college program during that time.

Advanced Placement Tests.—See page 23.

Achievement Tests.—See page 24.

Examinations for Waiving Curriculum Requirements.—A required course may be waived by the satisfactory passing of a waiver examination authorized and prescribed by the department or curriculum adviser concerned. Passing this examination does not entitle the student to any hours of credit toward the degree. Request to take the examination should be made to the curriculum adviser and the required fee paid at the Office of the Cashier before the date set for the examination.

CURRICULUM REQUIREMENTS

One hundred and twenty semester hours of course work are required for graduation. To be recommended by the Faculty for graduation, candidates are required to complete, in addition to the appropriate freshman and sophomore work, a minimum of 60 semester hours (second-group course work) in the junior and senior years selected from one of the two major field curricula offered by the School.

Curriculum for the First Two Years in Accounting and Business Administration

Freshman Year

		Semester Hours
Acct:	Acct 1–2	6
Econ:	Econ 1–2	6
Engl:	Engl 9 or 10, 11	6
Science:	B Sc 3–4 or 11–12; Chem 3–4 or 11–12; Geog 51 and 52; Geol 1–2; or Phys 1 and 2, 3 and 4, or 9–10	6–8
*Elective:	Courses other than in Accounting, Business Administration, or Economics	4–6
	Total	30

* Courses in Physical Education, Health, and Recreation may not be taken for credit.

Sophomore Year

		Semester Hours
B Ad:	B Ad 51	3
Humanities:	Art 31–32 or 71–72; Chin 3–4; Engl 51–52, 71–72, or 91–92; Fren 3–4 or 6, or 51–52; Germ 3–4 or 51–52; Ital 3–4 or 51–52; Mus 3 and 4; Slav 3–4, 5–6, or 91–92; Span 3–4 or 6, or 51–52; or Sp&D 1 and 11 (Accounting majors may postpone this requirement until the junior year if they wish to take Acct 121 or 191 in the sophomore year)	6
Math:	Math 31 and 32, or 51 and 52	6
Social Studies:	Psyc 1, 8	6
	Anth 1–2, Hist 71–72, P Sc 4 and 6 or 5 and 6, or Soc 1 and 2	6
Stat:	Stat 51	3
	Total	30

Accounting Major

Junior Year

		Semester Hours
Acct 101:	Cost and Budgetary Control	3
*Acct 121:	Intermediate Accounting	3
Acct 161:	Federal Income Taxation	3
*Acct 191:	Advanced Accounting	3
B Ad 102:	Fundamentals of Management	3
B Ad 131:	Business Finance	3
B Ad 141:	Basic Marketing Management	3
B Ad 161:	Commercial Law	3
Mgt 118:	Introduction to Information Technology	3
Elective:	Selected from courses other than in Accounting Business Administration, or Economics	3
	Total	30

Senior Year

Acct 132:	Accounting Theory	3
Acct 171:	Auditing	3
Acct 181:	Accounting Systems	3
B Ad 101:	The Business Environment	3
B Ad 181:	Manufacturing Production	3
B Ad 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Stat:	Three semester hours selected from the following	3
Stat 111:	Business and Economic Statistics I	
Stat 155:	Introduction to Probability	
Stat 187:	Theory of Sampling	

* If Acct 121 and 191 are elected in the sophomore year, students replace this requirement with 6 semester hours of Humanities (see above).

		Semester Hours
Elective:	Three semester hours selected from courses in Accounting*, Business Administration, or Economics, and three semester hours selected from courses in other departments	6
	Total	30

NORMAL SCHEDULE FOR ACCOUNTING COURSES

Junior Year: Fall—Acct 101, 121 (if not elected in sophomore year), 161; Spring—Acct 191 (if not elected in sophomore year), 161 (if not elected in fall).
Senior Year: Fall—Acct 171; Spring—Acct 132, 181.

ACCOUNTING PRACTICE INTERNSHIP

An internship program, limited to selected senior Accounting majors, is available during the semester break of the senior year. To be admitted to this program students must have the approval of the Chairman of the Department of Accounting and must have completed at least 15 semester hours of Accounting courses (including a course in auditing) with a 2.85 or higher average and an over-all grade of 2.50 by the end of the fall semester. Students will be paid a salary while conducting audits under senior supervision of participating C.P.A. firms. Other internships with industry and government are available. Students who complete the internship successfully will register for Acct 199 the spring semester of their senior year and will receive 3 semester hours of credit. For further information consult A.J. Mastro, Chairman of the Department of Accounting.

Business Administration Major

The program in Business Administration is designed to provide the broad foundation required for eventual top leadership in either governmental or business administration. It consists of the 36 semester hours of *required* courses; 15 hours† in one of the following group options; and 9 hours of electives, normally advanced courses in liberal arts subjects.

Junior Year

		Semester Hours
Acct 193:	Business Budgeting	3
B Ad 102:	Fundamentals of Management	3
B Ad 105:	Personnel Management	3
B Ad 131:	Business Finance	3
B Ad 141:	Basic Marketing Management	3
Mgt 118:	Introduction to Information Processing	

* Qualified students accepted in the Accounting Internship program will elect Acct 199 in place of 3 semester hours of elective selected from courses in Accounting, Business Administration, or Economics.
† Students who choose the group option in International Business are required to take only 12 semester hours of courses in that group if they have received credit for two years of modern foreign language or the equivalent.

		Semester Hours
Group Option:	Six semester hours selected from the chosen area of specialization (see below)	6
Elective:	To be selected in consultation with the adviser	6
	Total	30

Senior Year

B Ad 101:	The Business Environment	3
B Ad 161:	Commercial Law	3
B Ad 181:	Manufacturing Production	3
B Ad 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Psyc 144:	Personnel and Industrial Psychology	3
Group Option:	Nine semester hours selected from the chosen area of specialization (see below)	9
Elective:	To be selected in consultation with the adviser	3
	Total	30

GROUP OPTIONS

Eight areas of specialization are open to Business Administration majors. The 15 hours taken in each of these options require the approval of the adviser. The group option and the individual courses within the option should be selected *at the beginning of the junior year*. The student should contact the Chairman of the Department of Business Administration for assignment of an adviser.

GROUP I: ECONOMICS

The following courses provide the basic academic foundation for such positions as financial economic analyst, industrial economic analyst, and market research analyst in business and government.

B Ad 132:	International Business Finance
B Ad 133:	Capital Formation
B Ad 176:	International Business Theory and Policy
*Econ 101:	Intermediate Microeconomic Theory
*Econ 102:	Intermediate Macroeconomic Theory
Econ 158:	Industrial Organization
Econ 161, 162:	Public Finance I, II
Econ 181–82:	International Economics
Stat 111, 112:	Business and Economic Statistics I, II

GROUP II: FINANCE

The following courses provide the basic academic foundation for such positions as credit analyst, supervisor in a financial institution, bond cashier, trust officer, bank examiner, and similar positions in federal or international financial institutions.

*Acct 111:	Financial Statement Analysis
Acct 121:	Intermediate Accounting
B Ad 113:	Real Estate
B Ad 121:	Fundamentals of Insurance and Risk Management

* Required for this group option.

B Ad 122: Insurance and Estate Planning
B Ad 132: International Business Finance
B Ad 133: Capital Formation
*B Ad 138: Investment and Portfolio Management
Econ 101: Intermediate Microeconomic Theory

GROUP III: INFORMATION PROCESSING

The following courses provide the basic academic foundation for positions in information processing in government, business, and industry. They also give the student an understanding of the manager's use of information processing as a vital managerial technique.

*Mgt 119: Computer Programming for Information Systems
*Mgt 120: Information Systems Development I
*Mgt 121: Information Systems Development II
*Mgt 122: Special Studies in Information Systems

One additional 3-semester-hour course approved by the adviser

GROUP IV: INTERNATIONAL BUSINESS

The following courses provide the basic academic foundation for positions in international business, both in private industry and in government. Students in this option who have received credit for two years of a modern foreign language, or the equivalent, are required to take only 12 semester hours from the following courses.

*B Ad 132: International Business Finance
*B Ad 144: International Marketing Management
B Ad 175: Introduction to International Business
B Ad 176: International Business Theory and Policy
*B Ad 178: International Business Policy and Operations
Econ 181–82: International Economics

GROUP V: MARKETING

The following courses provide the basic academic foundation for such positions as sales manager, marketing manager, product development manager, research director, buyer, advertising director, sales promotion manager, and credit manager.

*B Ad 143: Marketing Research
B Ad 144: International Marketing Management
*B Ad 145: Sales Management
B Ad 147: Advertising
B Ad 158: Physical Distribution Management
B Ad 171: Principles of Transportation
B Ad 175: Introduction to International Business
B Ad 178: International Business Policy and Operations

GROUP VI: PERSONNEL MANAGEMENT

The following courses provide the basic academic foundation for such positions as personnel manager, employee relations manager, and employment manager in business and government service.

*B Ad 106: Problems in Personnel Management
*B Ad 107: Collective Bargaining
Jour 145: Principles and Problems of Public Relations
Psyc 129: Theories of Personality

* Required for this group option.

Psyc 131: Psychological Tests
Sp&D 121: Group Discussion and Conference Leadership

GROUP VII: STATISTICS

The following courses provide the basic academic foundation for such positions as financial statistician, planning statistician, industrial statistician, and rate analyst in business and government.

Stat 91: Principles of Statistical Methods
Stat 110: Quality Control and Reliability Techniques
*Stat 111, 112: Business and Economic Statistics I, II
Stat 117: Analysis of Variance
Stat 118: Regression Analysis
Stat 155: Introduction to Probability
Stat 157–58: Introduction to Mathematical Statistics

GROUP VIII: TRANSPORTATION AND LOGISTICS

The following courses provide the basic academic foundation for management positions in transportation firms and in traffic departments of other types of business firms and government agencies. The program should also aid in the preparation for the examinations for membership in the American Society of Traffic and Transportation.

B Ad 158: Physical Distribution Management
*B Ad 171: Principles of Transportation
B Ad 172: Public Utilities
*B Ad 173: Transportation Systems Management
B Ad 174: Urban Transportation
B Ad 175: Introduction to International Business
CE 183: Urban Planning
Geog 125: Transportation Geography

The Master's Degrees

Master of Business Administration.—The degree of Master of Business Administration is this School's top professional Master's degree in business. It is designed to develop the analytical ability and perspective which will contribute to success as a responsible executive. Because of the increasingly close relationship between government and business, the programs for this degree also provide an excellent background for many government careers.

Master of Arts in Government.—Washington, D.C., is uniquely situated for students of public administration. Public figures, professional government administrators, and specialized libraries are resources readily available to this School's programs in public administration. The degree of Master of Arts in Government is designed for graduate students who are seeking an education for entry into the federal service in an administrative capacity, or who wish to emphasize the academic elements of public administration. This program, like the Master of Public Administration and Master of Business Administration degree programs, provides several fields of concentration from which the candidate may select for in-depth study.

* Required for this group option.

Master of Public Administration.—The School of Government and Business Administration is located in the midst of a vast complex of government and government-related activities which are local, regional, national, and international in scope. This location provides a living laboratory of public administration for study and access to a unique concentration of working expertise in public administration. The Master of Public Administration degree provides a course of study particularly appropriate for those in the government service. It is a professional degree, preparing graduates for postions of higher managerial responsibility in the public service and generally improving their competence in public employment. Work done for this degree or the Master of Arts in Government degree with a field of concentration in Public Administration may lead directly toward the degree of Doctor of Public Administration.

Master of Arts in Health Care Administration.—This professional degree is designed to prepare students with interdisciplinary training for professional practice in administration and planning roles in public and private health organizations. Study in depth may be made in various aspects of Health Care Administration found in short-term hospitals, long-term health facilities (such as extended-care institutions, nursing homes, mental hospitals, facilities for the aged), group practice clinics, health information systems, and comprehensive health planning agencies.

Master of Urban and Regional Planning.—This professional planning degree is designed as preparation for careers on the municipal, county, state, and national levels in both public service and private consulting practice. The program of study is planned to provide a broad professional education, to develop competence in planning theory and methodology, and to emphasize the analytical ability and creativity necessary for solving urban and regional problems.

Master of Science in Administration.—The Master of Science in Administration degree is offered only off campus. It provides a course of study appropriate for those students currently working in government and business. It is a professional degree, preparing graduates for higher positions and greater responsibility and generally improving their competence as administrators.

ENTRANCE REQUIREMENTS

A Bachelor's degree from an accredited college or university that includes at least 90 semester hours of academic work, with a quality-point index of 3.00 (a *B* average) in the relevant undergraduate field, is required.

Applicants for admission to programs leading to the degree of Master of Business Administration must submit acceptable scores on the Admission Test for Graduate Study in Business; applicants for admission to programs leading to the degrees of Master of Arts in Government, Master of Arts in Health Care Administration*, Master of Public Administration, and Master of Urban and Regional Planning must submit scores on the Admission Test for Graduate Study in Business *or* the Graduate Record Examination. It is the responsibility of the applicant to make arrangements for the required test with the Educa-

* Scores on the Miller Analogies Test are also accepted in place of the Admission Test for Graduate Study in Business or the Graduate Record Examination for admission to the program of study leading to the degree of Master of Arts in Health Care Administration. The Miller Analogies Test is offered through the auspices of universities nationally.

tional Testing Service, Princeton, N.J. 08540. Correspondence concerning the Admission Test for Graduate Study in Business should be addressed to Box 966; concerning the Graduate Record Examination, to Box 955.

GENERAL REQUIREMENTS

A program of greater length, including undergraduate background courses, may be assigned for an applicant whose undergraduate degree was in a field other than the graduate program he wishes to follow, or whose undergraduate record indicates a weakness in required background courses.

Master's degrees are awarded by vote of the Faculty on completion of the required course work, an acceptable thesis (if one is elected or required) or the equivalent work, and the passing of the Master's Comprehensive Examination. An applicant whose background does not include the necessary courses must take a program longer than the minimum hours required.

Second-group courses (numbered 101-200) may be counted toward the Master's degree only when registration for graduate credit has been approved at the time of registration by the Dean and the curriculum adviser. No work counted toward a Bachelor's degree may also be counted toward a Master's degree.

Full-time students are normally expected to register for 9 to 12 semester hours each semester. A graduate student who is employed more than 20 hours a week may not take more than 6 semester hours. All work for a Master's degree *must be completed in five years*, unless an extension of time is granted by the Dean. Continuous registration does not serve the purpose of extending a student's degree candidacy beyond the five-year time limit.

A student who expects to continue his studies for the degree of Doctor of Business Administration or Doctor of Public Administration after receiving the Master's degree should ask for assistance in planning his program so that he may qualify for admission to candidacy for the Doctorate.

No credit is granted for work done *in absentia* or without formal instruction, except for hospital residency, supervised field experience, and the thesis, which may be completed *in absentia* with the permission of the department, curriculum adviser, or committee concerned.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to individual course examinations the candidate must pass a general written Master's Comprehensive Examination. In writing the examination the student is expected to correlate what he has learned in his course work and his reading in the literature of his fields. The examination normally requires from seven to nine hours writing time. Sections broadly cover the various fields in which the candidate has prepared himself.

The examinations are scheduled three times a year, in December, April, and July, and should be taken during the last semester of course registration or shortly after completion of the prescribed course work. The student must have completed all core requirements before being eligible to take the examination. If there is a lapse of time between completion of course work and the taking of the examination, the student must maintain continuous registration and must be registered for the semester or summer session in which the examination is taken.

The candidate should consult with his adviser, well in advance, as to the dates of his examination and the definition of the subject-matter fields which his examination is to cover. A written application is filed with the department supervising the student's elective field of study no later than 30 days prior to the examination date. Before applying for the examination, the student must have completed all of the courses in his program or be enrolled in his last semester, and he must have achieved a 3.00 (*B*) average. After applying for the Examination, a candidate may withdraw only by notice in writing to his Department Chairman.

A candidate who fails the examination may, in exceptional circumstances and with specific approval of his advisers, repeat the examination, but only after the lapse of one semester and the undertaking of additional preparation as prescribed. *If he fails a second time, no further opportunity to take the examination will be permitted.*

SCHOLARSHIP

Grades for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; and *CR*, Credit.

An average of *B* or better is required for the Master's degree. The grade of *C* is not considered as failing but must be counter-balanced by a grade of *A* in a graduate course of equal status.

A Master's degree candidate who receives a grade of *F* is required to present cause for consideration by the Dean's Council as to why he should be allowed to continue his studies toward a degree objective.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on page 44.

Removing an Incomplete.—The grade of *I* must be removed no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the Dean, or the appropriate committee, for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

REQUIRED COURSES IN ADMINISTRATION (Certain Fields)

The following courses in general administrative theory and practice are *required* of all candidates for the degree of Master of Business Administration and Master of Public Administration.

		Semester Hours
Mgt 201:	Advanced Administrative Management	3
Mgt 204:	Quantitative Factors in Administration	3
Mgt 207:	Human Behavior in Organizations	3

In addition, each student is normally required to take, from the following group, the course appropriate to his specific area of concentration:

		Semester Hours
Acct 276:	Management Planning and Control	3
B Ad 257:	Operation of the Multinational Firm	3
B Ad 297:	Business Policy Formulation	3
HCA 206:	Case Studies in Health Care Administration	3
P Ad 214:	Policy Analysis in Public Administration, or	
P Ad 260:	Policy Formulation and Administration	3

THE THESIS

Students contemplating doctoral study are strongly urged to include the thesis as a part of their Master's program. The thesis subject should be selected as early as possible so as to permit effective integration with the course work.

The subject must be approved by the professor in charge of the student's field. The thesis in its final form must have the approval of the professor in charge and must be presented to the Dean by the student no later than the date announced in the calendar. Printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the two semesters he registers for thesis (299–300), to the advice and direction of the member of the Faculty under whom the thesis is to be written. In case a thesis is unfinished, an additional successive academic year is granted without further tuition payment. The student must, however, maintain continuous registration during this period. If the preparation of the thesis extends more than three semesters beyond the date he registers for thesis 300, the student must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

OPTIONAL MASTER'S PROGRAM WITHOUT A THESIS

A thesis is required in certain degree programs and optional in others. In those programs where a thesis is optional and the student elects not to write one, the student must take a course in research methodology and one other elective.

MASTER OF BUSINESS ADMINISTRATION

Except for the field of concentration in Accounting*, curricula leading to the professional degree of Master of Business Administration include the following:

1. *The recognized Common Body of Knowledge in business administration.*

   Except for "policy courses," this may be fulfilled by waiver for prior work completed or by completing the courses listed below with a QPI of 3.00 or higher. A student with an undergraduate degree in business administration from an accredited institution is regarded as having completed the Common Body of Knowledge.

* For the curriculum leading to the degree of Master of Business Administration with a field of concentration in Accounting, see page 196.

	Semester Hours
The Common Body of Knowledge Courses Acct 1–2, or 115 and 193; B Ad 131, 141, 161, and 181; Econ 1–2 or 217–18; Mgt 203; and Stat 51 or 111	30
2. *Required Courses is Administration* Mgt 201, 204, and 207	9
One policy course, as appropriate, selected from B Ad 257, 297; or HCA 206	3
3. *Field of Concentration* (see pages 148-52) Twelve semester hours of course work, planned and scheduled with the student's academic adviser	12
4. *Research Requirement* Students electing to write a thesis will complete the appropriate thesis course (299-300); those not electing to write a thesis will complete one of the appropriate courses selected from B Ad 293 or Mgt 295, plus one 3 semester hour elective	6
5. *Elective* Depending upon the student's previous academic work in the Common Body of Knowledge	0–6

All students must complete a minimum of 36 semester hours of graduate course work. No more than 6 hours of graduate course credits can be transferred from other accredited institutions, and each transfer of credit must be approved by the Dean.

The degree of Master of Business Administration is awarded by vote of the Faculty upon the satisfactory passing of the Master's Comprehensive Examination, and the submission of an acceptable thesis if one is required.

The Master's Comprehensive Examination may not be taken before the last semester of course work.

FIELDS OF CONCENTRATION

Students select a minimum of 12 semester hours from one of the following fields of concentration.

ACCOUNTING

The field of concentration in Accounting is designed to provide a contemporary, broad-based academic preparation which will apply equally to the fields of accounting in government, industry, and public practice as well as to the field of general administration employing accounting as an effective means of understanding the organization. (See page 196 for program of study.)

BEHAVIORAL SCIENCES IN ORGANIZATION DEVELOPMENT

The curriculum in this program reflects the assumption that the effective utilization of the behavioral sciences is concerned with both means and ends; that the specialist in behavioral science not only is skilled in theory and research but also applies his technical and specialized knowledge as a conscious force in effective organizational growth and improvement. Thus, courses are designed to

equip the student with organizational concepts and behavioral skills appropriate to optimizing the utilization of a system's total resources.

This program is designed to fulfill the need for professionals capable of designing, creating, and developing the necessary behavioral and organizational systems appropriate to rapidly changing societies. Emphasis is on the interrelationships of such dimensions as motivation, leadership, problem-solving, organizational growth, and increased complexity of modern organizations and their effect upon the functions of organizational development.

BUSINESS-GOVERNMENT RELATIONS

This field of concentration provides a knowledge and understanding of the total business environment essential to business policy formulation and execution; gives a keener appreciation of the role and function of business in a free enterprise society, its environmental needs for optimum effectiveness, and what government can and should contribute to that environment; familiarizes students with successful techniques by which the content and direction of public policy toward business can legally be influenced; and provides students with a thorough knowledge of current government policies toward business, contemporary issues affecting government-business relations, and possible solutions to problems in this area.

This field serves the needs of students of the business environment at the Master's and Doctoral levels and is based on the premise that the enormous influence of government on buiness and vice-versa—exercised in the roles of regulator, customer, supplier, protector, and competitor—will become even more pervasive and that business policy formulation and execution and business decision-making will become increasingly dependent upon thorough knowledge and understanding of the total environment of business and, most importantly, of government policies, programs, and laws affecting business.

FINANCE AND INVESTMENTS

The field of concentration in Finance and Investments prepares students for careers in finance and investments, providing a background in business budgeting, controllership, treasury, long-range planning, reporting, and financial management processes. Courses are designed to emphasize the planning, analysis, implementation, and controls necessary for making effective financial decisions. Instruction not only applies to manufacturing and trading enterprise but, in addition, includes railroad and public utility financing. Each, however, has distinctive operating features. Most financial dogmas have a universality that cuts across business lines, and variations are more a matter of degree than a form of substantive difference.

HEALTH CARE ADMINISTRATION

The program of study for the field of concentration in Health Care Administration consists of both on-campus academic studies and off-campus field practice assignments. Ordinarily full-time students can expect to complete the entire degree program within two years, provided they have the background courses for admission to the Master of Business Administration degree program.

INFORMATION TECHNOLOGY

The field of concentration in Information Technology is designed to provide a managerial understanding of the principles of manual, mechanical, and electronic information processing, including computer programming concepts, methods, and languages; an appreciation of the capabilities, limitations, and selection procedure of information processing equipment; a knowledge of all phases of management information systems development, implementation, and evaluation; and an understanding of the roles of both management and systems personnel in information technology. It also provides an appreciation of the role of information technology as a tool of management.

Students actually participate in the development of management information systems; in the selection of computer equipment; and in the installation, management, and evaluation of management information systems—during class sessions.

INTERNATIONAL BUSINESS

The field of concentration in International Business is designed to prepare students for careers in firms operating on a multinational basis or about to enter the international field; for careers in the federal government and in international agencies concerned with business, industry, and finance abroad; and for the Commerce option of the Foreign Service Officer Examination.

This program is also designed to provide foreign students with the background and skills necessary to promote international business, and to prepare them for careers in foreign and domestic firms within their own countries and for commercial officer positions within their governments.

Each student's program is individually developed by the student's adviser according to the student's background and interests.

ADMINISTRATION OF SCIENCE AND TECHNOLOGY

The field of concentration in Administration of Science and Technology explores the many aspects of technology relating to and influencing research and development management, business, and public policy. The employment of "state-of-the-art" technology and the creation of new technology through research and development are important processes in the achievement of the objectives of both private firms and governments.

The research and development environment has many unique operational characteristics. The program of graduate study in this concentration has been designed to identify and study the problems associated with managing creative professional people in a dynamic technology. As a contextual area, the program stresses the need for students to undertake original and meaningful research involving political, economic, sociological, and operational problems encountered by management in industrial, governmental, and military research and development organizations.

MANAGERIAL ECONOMICS

The field of concentration in Managerial Economics is the study of economic institutions and analytical methods, taken from the point of view of business or

governmental management. Its purpose is to develop (1) a broad understanding of the tools of economics; (2) an analytical power with respect to various facets of an organization's activity or multi-organizational areas of special interest; (3) a skill in problem-oriented applications of economic tools; (4) an ability to interpret historical development and predict future trends in firms, industries, and economies; (5) a familiarity with the institutional setting of economic activity; and (6) an appreciation of the economic reasoning behind public policies.

With a strong orientation to the economic problems of organizations, this field of concentration is based on the methodology of general economics, which it supplements with the methods of management science.

Managerial economics presumes skills in quantitative methods, statistics, and intermediate-level general economics. It is offered in a sequence that commences with courses based on microeconomic and macroeconomic tools respectively.

MARKETING

The field of concentration in Marketing encompasses all phases of supply and demand, from procurement and materials handling to product presentation and distribution. A student may concentrate in several subfields: marketing research, sales management, advertising, retailing, and international marketing. In addition, study may be complemented with courses from fields such as anthropology, geography, journalism, mathematics, psychology, sociology, and others.

OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

The field of concentration in Operations Research and Systems Analysis develops a thorough understanding of quantitative or mathematical approaches to problems of managerial control and decision-making. While the program will develop a competent background in basic mathematical theory associated with the various techniques, it is oriented toward applications of the techniques rather than their theoretical mathematical content.

PERSONNEL MANAGEMENT

Personnel Management is concerned with all aspects of the employment of human resources in business organizations. It is a challenging field—dynamic and rapidly growing in scope and importance. Career opportunities are open in domestic and international business organizations, hospitals, trade associations, research and educational institutions, and local, state, and federal government agencies. Courses encompass all phases of the recruitment, selection, employment, and development of people, industrial relations, unionism, collective bargaining, labor relations, and manpower utilization.

PROCUREMENT AND CONTRACTING

The field of concentration in Procurement and Contracting responds to the recognized need for greater professionalism and sophistication among those engaged in procurement activities of the federal government and in contracting activities of vendors to the federal government.

The sustained increase in federal purchasing—in volume, variety, and complexity—places ever greater demands upon the skill and resourcefulness of procurement and contracting personnel. The field has therefore been designed with the following objectives: (1) to provide a broad professional education in the knowledge and skills necessary for success in this field; (2) to develop in the student increased ability in analysis, decision-making, and communications; (3) to increase the student's appreciation of the economic, social, legal, and technological consideration present in procurement and contracting activity.

TRANSPORTATION

The field of concentration in Transportation is concerned with both private and public planning and the management of a viable transport system which will best serve the needs of the nation and its industries within a competitive framework. It is an integral function of all levels of government as well as of every unit of industry throughout the nation.

MASTER OF PUBLIC ADMINISTRATION

This program of study is particularly appropriate for those students currently in governmental service who are seeking professional advancement in their careers. The Master of Public Administration degree is a professional degree, preparing graduates for policy and managerial responsibilities in the public service and generally improving their competence in public management. Work done for this degree may also serve as a basis for further work leading to the degree of Doctor of Public Administration.

The degree is awarded by vote of the faculty upon the candidate's satisfactorily completing course requirements and passing the Master's Comprehensive Examination. The basic academic program requires 39 semester hours. (This may be slightly higher for specific options.) The thesis is optional. All candidates, however, must successfully complete a 3-semester-hour course in research methods.

All undergraduate degree backgrounds are regarded as qualifying for admission to this degree program. No more than 6 semester hours of graduate credit can be transferred from other accredited institutions, and transfer of credit must be approved by the Dean.

Each student develops an individual program in consultation with his faculty adviser from among three related fields of study. All students must fulfill the requirements of the field of Administrative Theory and Practice (12 semester hours of *required* courses, see pages 146-47). The student may select as a second field either General Public Policy and Administration (15 semester hours) or Metropolitan Public Policy and Administration (15 to 18 semester hours). One of the following must be chosen as a third field (the number of semester hours is indicated in parentheses after each field:

Behavioral Science (9)
Budgeting and Finance (12)
Development Administration (9)
Health Care Administration (9)
Information Technology and Systems Management (9)
Manpower Management (9)
Metropolitan Administration (12)

Procurement Administration (9)
Public Personnel Administration (9)
Research and Development Administration (9)
Urban and Regional Planning (9)

MASTER OF URBAN AND REGIONAL PLANNING

The program of graduate study in Urban and Regional Planning leads to the professional planning degree of Master of Urban and Regional Planning. It is designed as preparation for careers on the municipal, county, state, and national levels, and for private professional practice. The course of study is designed to provide a broad professional education, to develop competence in planning theory and methodology, and to emphasize the analytical ability and creativity necessary for solving urban and regional problems. Each student's program is designed in consultation with an assigned faculty adviser in accordance with his individual career plans.

The degree is awarded by vote of the Faculty after satisfactory completion of (1) from 45 to 60 semester hours of course work, depending upon the background and experience of each individual student, including a thesis equivalent to 6 semester hours (most students will ordinarily be required to take 60 semester hours); (2) a minimum of three months' full-time professional training in a planning agency under qualified supervision, with an acceptable written report to be submitted after completion of the training period; (3) a written Master's Comprehensive Examination; and (4) a thesis based on the candidate's research in the field of urban and regional planning.

MASTER OF ARTS IN GOVERNMENT

Curricula leading to the degree of Master of Arts in Government are available with major fields in International Management, Manpower Management, Metropolitan Administration and Planning, Public Administration, Public Financial Management, and Public Personnel Management.

The programs leading to this degree require a minimum of 39 semester hours of course work. Detailed program course sequences are available from the Department of Public Administration.

MASTER OF ARTS IN HEALTH CARE ADMINISTRATION

The program of study leading to the degree of Master of Arts in Health Care Administration consists of a basic minimum two-year period of graduate study, normally including both on-campus academic studies and off-campus field practice assignments. The length of each period is dependent upon the study-in-depth concentration, which the student elects. The majority of students begin their studies in the fall semester of each year. However, a limited number of qualified students may be admitted to begin their course work in the spring semester and summer sessions. The basic curriculum is developed in keeping with the background and professional goals of each student and ordinarily

consists of a minimum of 48 semester hours. Undergraduate courses in Accounting, Economics, and Statistics are required as a prerequisite for all of the concentrations in this program.

Ordinarily full-time students can expect to complete the on-campus phase of the degree program in two to three semesters, and the administrative residency or field practice in one to two calendar years. The total time depends on past academic course work and experience in the health care field.

Students will select one of the following concentrations: Administration of Long-term Care Facilities, Comprehensive Health Planning, Health Information Systems, or Hospital Administration.

ADMINISTRATION OF LONG-TERM CARE FACILITIES

The concentration in Administration of Long-term Care Facilities is designed to prepare students for administration in such areas as nursing homes, facilities for the aged, mental hospitals, and community health clinics.

During the first phase the student must complete a satisfactory academic program of course work, selected in accordance with his background and needs. These courses cover the general technical background of health care administration, general administrative theory and practice, and problem-solving in the management of extended care and long-term care patients.

The second phase is a period of field experience as an administrative resident under a qualified preceptor. A written major report or selected field project reports are required.

COMPREHENSIVE HEALTH PLANNING

The concentration in Comprehensive Health Planning is designed to prepare students to plan for and coordinate all aspects of private and public health care systems in accordance with sound management principles. It is an interdisciplinary program which includes courses from (1) health care administration; (2) health care planning; (3) supporting disciplines such as sociology, urban and regional planning, quantitative methods, public administration; and (4) a particular area of concentration selected by the student to gain a specific skill.

In addition to the course work there are periods of supervised field experience. Written reports are required.

HEALTH INFORMATION SYSTEMS

The concentration in Health Information Systems recognizes the rapidly growing demand for individuals who can develop and implement the use of computer-based information systems in decision-making approaches. It is designed to prepare those who wish to supervise and coordinate data collection, processing, and retrieval activities for health care complexes.

During the first phase the student must complete a satisfactory academic program of course work, selected in accordance with his background and needs. These courses cover the general and technical background of health care administration and general administrative theory and practice. In addition students must complete required courses in computer services and information handling.

The second phase consists of supervised field experience, which includes written reports.

HOSPITAL ADMINISTRATION

The concentration in Hospital Administration is divided into two phases. During the first phase the student must complete a satisfactory academic program of course work, selected in accordance with his background and needs. These courses cover the general and technical background of health care administration, general administrative theory and practice, and problem-solving in the area of management as it relates to short-term care hospitals.

The second phase is a period of field experience as an administrative resident under a qualified preceptor. A written major report or selected field project reports are required.

Post-Master's Graduate Certificate in Health Care Administration

STUDENTS WITH APPROVED MASTER'S DEGREES from accredited institutions may take a special Post-Master's program leading to a Post-Master's Graduate Certificate in Health Care Administration. Each program will be planned to meet the professional needs of the individual student, whether he wishes to undertake a new field of study or to amplify his knowledge of work done at the Master's level.

This program permits study in depth of such areas as health care administration consulting; comprehensive health planning; government health care administration at federal, state, and county levels; long-term care administration, including mental hospitals, nursing homes, and facilities for the aged; and health care administration research.

Prerequisite: a Master's degree from an accredited college or university and an academic average which indicates the ability to undertake advanced study. The applicant is also judged on his experience, character, and personality. Applicants lacking formal study in health care administration are required to take qualifying courses.

REQUIREMENTS FOR THE CERTIFICATE

Most students with adequate preparation in the health care field should be able to complete the requirements by taking a program of study with a minimum of 30 semester hours of course work. Those lacking such specialized study will need more. At the discretion of the student's advisory committee a maximum of 6 semester hours may be transferred from another accredited institution if the work was taken for credit toward a graduate degree.

PROGRAM OF STUDIES

HCA 270 *Research in Health Care Administration*, HCA 285–85 *Readings in Health Care Administration*, and HCA 288 *Seminar: Field Problem Studies in Health Care Administration* are required of all candidates for the Certificate.

The remaining courses consist of a program of study worked out in consultation with a faculty adviser and planned with consideration of the student's experience and educational background and his specific professional objectives.

Doctoral Study

WORK FOR THE DEGREES of Doctor of Business Administration and Doctor of Public Administration is supervised by the Committee on Doctoral Studies.

ADMISSION

Completed application forms must be sent to the Office of the Admissions Officer, School of Government and Business Administration, George Washington University, Washington, D.C. 20006. The applicant should ask three individuals, who are acquainted with his ability to do high-level academic work, to write directly to the Chairman of the Committee on Doctoral Studies. These letters of reference should be on special forms which will be provided by the Committee Chairman. Applicants for the degree of Doctor of Business Administration must file results of the Admission Test for Graduate Study in Business with the Office of the Admissions Officer before final approval of their applications can be given. Applicants for the degree of Doctor of Public Administration must submit results of either the Admission Test for Graduate Study in Business *or* the Graduate Record Examination to the Office of the Admissions Officer. These tests must have been taken within the past five years. Arrangements to take these tests must be made with the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947 Center Street, Berkeley, Calif. 94704.

An applicant must have a degree of Master of Business Administration or Master of Public Administration, as appropriate; or a Master of Arts degree in an approved field; or the equivalent, together with acceptable personal qualities and a capacity for creative scholarship. Each applicant must demonstrate his competence by qualifying examinations.

PLAN OF STUDY

The fields of (1) Administrative Theory and Practice and (2) Managerial Economics are required for the Doctor of Business Administration degree; the fields of (1) Administrative Theory and Practice and (2) American Political Process and Public Administration are required for the Doctor of Public Administration degree. The Chairman of the Committee on Doctoral Studies, in consultation with the applicant, will designate two elective fields of study and will appoint an adviser to guide the student in his work in each of the fields undertaken. Elective fields may be chosen from such areas as Accounting, Administration in Metropolitan Areas, Behavioral Sciences in Organization Development, Comparative and Developmental Administration, Finance and Investments, Government-Business Relations, Health Care Administration, Information Technology, International Business Administration, Managerial Economics, Marketing, Operations Research, Personnel Management, Productio

and Procurement, Public Financial Management and Budgeting, Public Personnel Management, Management of Science and Technology, Transportation and Traffic, and Urban and Regional Planning. Most students will complete, prior to the General Examination, a minimum of 30 semester hours in graduate courses and such additional course work as may be prescribed by the adviser; but, the exact content of each program is determined in light of the student's background and competence after consultation with the appropriate faculty member in each of the fields undertaken.

Full-time students are normally expected to register for 9 to 12 semester hours each semester. All work for the Doctor's degree must be completed in five years unless an extension of time is granted by the Committee on Doctoral Studies prior to the expiration of the time limit. All course work must be taken on campus unless otherwise approved in advance by the Dean.

When the applicant has completed all course work and has satisfied his adviser and the Committee of his readiness to take the General Examination in the fields of study previously designated, the examination will be scheduled during the following February or October.

Upon successful completion of the General Examination and approval of the subject of the doctoral dissertation, the student may be admitted to candidacy by the Committee on Doctoral Studies. The candidate's research and the preparation of his dissertation are supervised by a Research Adviser designated by the Committee.

After admission to candidacy, the student must register for 24 hours of *Dissertation Research* (399). Full-time students must register for 9 to 12 hours a semester for 2 semesters, and for sufficient hours in the third semester to complete the 24-hour requirement. Part-time students must register for 6 semester hours a semester for 4 semesters. If the dissertation has not been completed during the time the student has registered for the required 24 hours, he must register for 3 semester hours of *Dissertation Research* (399) each succeeding semester until the satisfactory completion of the dissertation and the final oral examination.

THE DISSERTATION

A dissertation is required as evidence of ability to perform scholarly research and to interpret and present its results.

No later than the date specified in the Calendar the candidate must submit to the Dean three complete copies of the dissertation and an original copy of an abstract of his dissertation for inclusion in the Announcement of the Final Examination and for reproduction by University Microfilms, Inc.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation, preparation of the abstract, and services offered by University Microfilms, Inc., are available in the Office of the Committee on Doctoral Studies. The successful candidate for the doctorate is required, before receiving his degree, to pay a fee to cover the expense of printing the abstract of his dissertation, and for the basic service rendered by University Microfilms, Inc. (see page 29).

THE FINAL EXAMINATION

The Final Examination of the candidate consists of his oral defense of the dis-

sertation and is given by a committee appointed by the Committee on Doctoral Studies. Upon successful completion of this oral examination the candidate will be approved for the degree of Doctor of Business Administration or Doctor of Public Administration by the Committee on Doctoral Studies.

RESIDENCE

The Committee on Doctoral Studies expects all students to remain registered until *all* degree requirements are satisfied, although there is no formal regulation concerning the minimum amount of time of study either in preparation for the General Examination or as a doctoral candidate engaged in research. The student who undertakes either part of the doctoral program on a full or limited schedule must maintain "continuous registration" under the School of Government and Business Administration even when he is granted a leave of absence for study or residence elsewhere. By failing to register for one semester or more, the student breaks his registration and must apply for readmission to the School under whatever new conditions and regulations are set up by the Committee or the member of the Faculty who directs his research. The student who has completed his tuition requirements, but whose graduation is deferred for any reason, must maintain continuous registration by paying the continuous registration fee for the semester immediately preceding the graduation at which he expects to receive his degree.

Special Programs

GOVERNMENT MANAGEMENT INTERN SCHOLARSHIP PROGRAM

THE GOVERNMENT MANAGEMENT INTERN SCHOLARSHIP PROGRAM offers annually fifty scholarships to assist federal agencies in training carefully selected young men and women for administrative leadership in government career service. Each scholarship provides a tuition-free course of 3 semester hours a semester, and interns who maintain satisfactory standing in both their academic program and their government training program may qualify for extension of the scholarship for one additional semester.

NAVY GRADUATE FINANCIAL MANAGEMENT PROGRAM

The Navy Graduate Financial Management Program, sponsored by the Naval Postgraduate School, provides 45 semester hours of work in financial management and related fields for a selected group of Naval and Marine officers. The Master of Business Administration degree is awarded upon successful completion of this full-year program.

CONTINUING EDUCATION IN HEALTH CARE ADMINISTRATION

A nondegree program is conducted in the various areas of health care administration both on campus and off campus whenever a sufficiently large class is organized. Institutes, workshops, and lecture series are conducted under the auspices of program faculty and selected leaders from local, state, and regiona

areas on topics of current interest to the requesting organization. There is no specific prerequisite. Fees are to be announced.

THE INTERNATIONAL INSTITUTE FOR HEALTH CARE ADMINISTRATION

In recognition of special educational needs of students from other countries, The International Institute for Health Care Administration offers programs of instruction designed to meet these needs at either the degree or certificate level.

It is also equipped to enter into arrangements with principles of hospital systems in world-wide areas to assist in the preparation of teaching programs or the actual instruction of administrative personnel either abroad or at the University.

THE MANAGEMENT RESEARCH GROUP

The Management Research Group seeks to serve government, industry, and commerce by contributing to the development and understanding of basic theory in the field of management. The Group also provides assistance in translating theory into practice.

Relationships and techniques important to modern information flow and managerial decision-making are stressed. The research conducted extends to system design, analysis of system performance, and the evaluation of practice in relation to managerial criteria.

CERTIFICATION OF PUBLIC PURCHASING AGENTS

The School of Government and Business Administration participates in the National Institute of Governmental Purchasing professional certification program. Courses and examinations leading to qualification as "Certified Public Purchasing Officer" (CPPO) are provided. Inquiries may be directed to the School or to the National Institute of Governmental Purchasing, 1001 Connecticut Avenue, N.W., Washington, D.C. 20036.

BACHELOR OF SCIENCE IN HEALTH CARE ADMINISTRATION

The purpose of the program of study leading to the degree of Bachelor of Science in Health Care Administration is to develop persons who have a broad managerial education for beginning administrative and planning level positions in hospitals and related health organizations. At this time the degree program is limited to students in the Naval School of Hospital Administration at Bethesda, Md.

OFF-CAMPUS DEGREE PROGRAMS

The School of Government and Business Administration has academic jurisdiction over off-campus programs leading to the following degrees: Bachelor of Science in Administration with concentrations in accounting and business administration and the Master of Science in Administration.

These degree programs are administered by the College of General Studies. For details concerning the off-campus programs see the *College of General Studies* Catalogue.

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

Dean B.M. Sapin

FACULTY*

Professors Joseph Aschheim, R.H. Davidson, C.E. Galbreath, Marvin Gordon, Andrew Gyorgy, P.P. Hill, H.C. Hinton, Ching-Yao Hsieh, J.W. Kendrick, H.L. LeBlanc, R.K. Lewis, F.H. Michael, J.A. Morgan, Jr., J.N. Mosel, Benjamin Nimer, Vladimir Petrov, J.W. Robb, H.M. Sachar, B.M. Sapin, R.P. Sharkey, Chung-wen Shih, Gaston Sigur, Henry Solomon, George Stambuk, C.T. Stewart, Jr., R.B. Thompson, Helen Yakobson

Adjunct Professor T.F. Carroll

Associate Professors R.M. Dunn, Jr., G.C. Eads, C.F. Elliott, W.R. Johnson, Young Kim, C.A. Linden, J.M. Logsdon, J.K. McDonald, C.A. Moser, Peter Poole, Bernard Reich, Richard Thornton, S.J. Wayne, R.Y.C. Yin

Adjunct Associate Professors Donald Robinson, R.A. Young

Assistant Professors S.W. Burks, R.L. Cole, R.E. Darcy, Dana Fischer, J.E. Fredland, S.A. Grant, P.F. Klarén, K.J. Langran, D.L. Lee, H.R. Nau, L.P. Ribuffo, J.M. Starrels, G.C.Y. Wang, A.M. Yezer

Adjunct Assistant Professor K.L. Storrs

Instructor Rachel Keith

COMMITTEES†

DEAN'S COUNCIL

S.W. Burks, R.M. Dunn, Jr., C.F. Elliott, Marvin Gordon, P.P. Hill, H.C. Hinton, W.R. Johnson, J.M. Logsdon, Vladimir Petrov, George Stambuk, Richard Thornton

COMMITTEE ON PROGRAMS AND CURRICULUM

R.M. Dunn, Jr., H.C. Hinton, H.L. LeBlanc, Benjamin Nimer, R.B. Thompson

COMMITTEE ON ADMISSION AND ADVANCED STANDING

F.H. Michael (*Chairman*), C.F. Elliott, Andrew Gyorgy, W.R. Johnson, J.A. Morgan, Jr.

* The President of the University, the Vice President for Academic Affairs, the Registrar of the University, the Director of Admissions of the University, and the University Librarian are ex officio members of the Faculty of the School of Public and International Affairs.
† The Dean of the School is an ex officio member of all committees.

COMMITTEE ON CHINESE STUDIES

W.R. Johnson (*Chairman*), H.C. Hinton, F.H. Michael, Chung-wen Shih, Richard Thornton, R.Y.C. Yin

COMMITTEE ON RUSSIAN STUDIES

C.A. Moser (*Chairman*), C.F. Elliott, John Hardt, Vladimir Petrov, R.B. Thompson, Helen Yakobson

COMMITTEE ON SCIENCE, TECHNOLOGY, AND PUBLIC POLICY STUDIES

C.E. Galbreath, Andrew Gyorgy, J.M. Logsdon, J.K. McDonald, Benjamin Nimer

INTRODUCTION

With the establishment, in 1898, of the School of Comparative Jurisprudence and Diplomacy, the study of Government was first organized as a separate entity in the University. In 1928, this School was reorganized and broadened as the School of Government. During the next two decades, programs in business administration and public administration were added, and the emphasis gradually shifted from undergraduate to graduate study. The name was changed in 1960 to the School of Government, Business, and International Affairs to reflect more accurately the offerings of the School. A division of the School was effected in 1966, and two schools were established—the School of Government and Business Administration, a primarily professionally-oriented school, and the School of Public and International Affairs, a primarily policy-oriented school.

Programs of the School of Public and International Affairs are interdisciplinary, and emphasize governmental policy, both domestic and foreign.

Students in the freshman and sophomore years are registered in Columbian College of Arts and Sciences, the liberal arts college of the University, and are assigned special advisers from the School of Public and International Affairs to assist them in planning their programs.

ACADEMIC PROGRAMS

Programs available within the School of Public and International Affairs are undergraduate fields in Chinese Language and Literature, Chinese Studies, and Urban Affairs; undergraduate and graduate fields in International Affairs and Public Affairs; and graduate fields in Latin American Studies, Russian Studies, and Science, Technology, and Public Policy. Special programs in Soviet, Far Eastern, and East European studies are offered by the School's Institute for Sino-Soviet Studies.

OBJECTIVES

Four undergraduate programs of study—Chinese Studies, International Affairs, Public Affairs, and Urban Affairs—are aimed at preparing the student to understand major contemporary issues in international affairs or in domestic public

affairs. The programs are designed not to produce narrow professional specialists, but to foster a liberal education, interdisciplinary in nature and broader than a concentration in one of the conventional disciplines. In each program there is double effort: to develop a background as broad and as deep as possible in order to assist in the understanding and analysis of modern problems, and to give instruction in some useful tools of analysis. The program in Chinese Language and Literature is closer to the traditional liberal arts pattern, emphasizing language and culture.

The graduate programs leading to the degree of Master of Arts are more concentrated. The student is expected to develop a greater competence in an area or a discipline, building on his undergraduate program in preparation for professional employment in government, in international organizations, in business, or in private agencies concerned with public or international affairs.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *are stated on pages 21-32; other University regulations, on pages 43-50.*

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid.

The student is held responsible for all the work of the courses in which he is registered, and all absences must be excused by the instructor in charge before provision is made for him to make up the work missed.

A student suspended for any cause may not attend classes during the period of suspension.

WITHDRAWAL

Withdrawal after the end of the fifth week of classes (fall or spring semester) without academic penalty is permitted only in exceptional cases (see "Withdrawal," page 45).

The Degree of Bachelor of Arts

THE SCHOOL OFFERS PROGRAMS leading to the degree of Bachelor of Arts in the fields of Chinese Language and Literature, Chinese Studies, International Affairs, Public Affairs, and Urban Affairs.

ENTRANCE REQUIREMENTS

The satisfactory completion of the *Chinese Language and Literature, Chinese Studies and International Affairs, Public Affairs,* or *Urban Affairs* curriculum in Columbian College of Arts and Sciences (see pages 78-80), or the equivalent, is required.

GENERAL REQUIREMENTS FOR THE DEGREE

The following requirements apply to both the standard 120-semester-hour and the special 90-semester-hour programs. See pages 165-66 for additional requirements for the 90-semester-hour program.

ACADEMIC WORK LOAD

Normal academic work load for the full-time student is 15 semester hours. A student with a strong academic record may take up to 18 semester hours with the approval of the Dean.

SCHOLARSHIP

In order to graduate, a student must have the following: (1) 120 semester hours (or 90 semester hours if the student qualifies for the special 90-semester-hour program) of passing grades (courses in Physical Education, Health, and Recreation cannot be included in the required hours); and (2) grades of *A* or *B* in four 3-semester-hour courses in the major, to be taken in residence at George Washington University. The major includes the required second-group courses (101-200) and courses taken in the group options.

DEAN'S HONOR LIST

The name of every student who attains a 3.50 quality-point index* in his course work is placed on the Dean's Honor List for that semester. Appearance on the List will be limited to (1) full-time students registered for a minimum of 12 semester hours and (2) part-time students registered for a minimum of 12 semester hours over a period of two consecutive semesters, which may include a summer term.

ACADEMIC STANDING

A student who is not suspended or on probation is considered to be in good standing.

The following rules governing probation and suspension are applicable as stated to students enrolled for a full-time program (12 semester hours or more) during the fall or spring semester or the two summer sessions. For students taking less than 12 semester hours in any one semester or both summer sessions, these rules are applied on the basis of 12 or more hours taken during two or more semesters or summer sessions.

PROBATION

A student who in one semester receives two grades of *F*† in courses carrying 3 or more semester hours of credit each, or the equivalent, is placed on probation. A student on probation who receives one grade of *F*† in such a course will be continued on probation for a second semester. A student on probation

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* See page 44 for explanation of the quality-point index.

† In determining whether a student is placed on probation or suspension, two grades of *D* are equated with one grade of *F*. Thus, for example, a student who receives one grade of *F* and two grades of *D* is placed on probation, and a student who receives two grades of *F* and two grades of *D* is suspended.

taking 12 or more semester hours whose grades are all *C* or better is removed from probation.

SUSPENSION

A student who in one semester receives grades of *F** in three courses carrying 3 or more semester hours of credit each, or the equivalent, is suspended. A student on probation who receives two or more grades of *F** in such courses is suspended. A student who receives one or more grades of *F** in such courses in a second semester on probation is suspended.

A student who is suspended for poor scholarship may apply for readmission after the lapse of either the fall or spring semester. To be considered for readmission, he must pass prescribed tests and submit evidence to the Dean's Council that during his absence from the University he has so conducted himself as to indicate that he will profit by readmission. A student readmitted after suspension is on probation. In no case will the probationary period after readmission exceed 24 hours of study. A student suspended twice for poor scholarship will not be readmitted.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on page 44.

Removing an Incomplete.—The grade of *I* must be removed no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the Dean, or the appropriate committee, for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

RESIDENCE

A minimum of 30 semester hours, including at least 12 hours in the major field, must be completed while registered in the School of Public and International Affairs. This requirement applies to students transferring within the University as well as to students transferring from other institutions. Unless special permission is granted by the Dean to pursue work elsewhere, the work of the senior or final year must be completed in the School of Public and International Affairs.

USE OF CORRECT ENGLISH

Any student whose written or spoken English in any course is unsatisfactory may be reported by the instructor to the Dean. The Dean may assign supplementary work, without academic credit, varying in amount with the needs of the student. If the work prescribed is equivalent to a course, the regular tuition

* In determining whether a student is placed on probation or suspension, two grades of *D* are equated with one grade of *F*. Thus, for example, a student who receives one grade of *F* and two grades of *D* is placed on probation, and a student who receives two grades of *F* and two grades of *D* is suspended.

fee is charged. The granting of a degree may be delayed for failure to make up any such deficiency in English to the satisfaction of the Dean.

STUDY ABROAD

Students wishing to study abroad must consult with their advisers and the Dean, because arrangements must be made on an individual basis. Students should receive the Dean's approval, in advance, for their plan of study abroad if they plan to have the credits earned abroad apply to the degree program they are registered for in this School. A catalogue or other description of the foreign institution or study program should be presented for consideration together with detailed descriptions of the courses to be taken. Students of international affairs are encouraged to travel and study abroad.

CREDIT/NO CREDIT OPTION

A student in the School of Public and International Affairs who has a cumulative quality-point index* of 2.50 or better may, with the approval of his adviser and the Dean, take one course each semester and receive a grade of *CR*, Credit, or *NC*, No Credit, which will be recorded on the student's transcript but will not be reflected in his cumulative grade average. A student must sign up for such an option at registration. Under no circumstances may a student change from credit/no credit status to graded status, or vice versa, after the end of registration. Courses in the student's major (except those in which the grade of *CR* or *NC* is normally assigned) may not be taken on a credit/no credit basis. A transfer student may not elect to take a course on a credit/no credit basis until the second semester of his enrollment in the University. Students in the School of Public and International Affairs may take no more than six courses in which the grade of *CR* or *NC* is assigned, including those in which the grade of *CR* or *NC* is normally given and those taken in any other college, school, or division of the University prior to transferring to the School of Public and International Affairs.

CORRESPONDENCE AND HOME-STUDY COURSES

Credit for correspondence or home-study courses is not acceptable and cannot be applied toward a degree.

ADDITIONAL REQUIREMENTS FOR THE 90-SEMESTER-HOUR PROGRAM

Exceptional students may, when registered as freshmen or sophomores in Columbian College of Arts and Sciences, petition the Dean of the School of Public and International Affairs for admission to a special 90-semester-hour degree program in the School of Public and International Affairs, supplying supporting evidence in the form of achievement test scores, College-Level Examination Placement (CLEP) scores, and grades earned at George Washington University or any other institution. The Dean, in consultation with the Dean's Council, will determine eligibility for admission to the program, which will be effective upon the student's entering the School of Public and International Affairs at the beginning of the junior year.

* See page 44 for explanation of the quality-point index.

In addition to the general requirements (see pages 163-65) and the curriculum requirements (see pages 166-68), a student in the 90-semester-hour program must fulfill the following requirements.

1. He must receive grades of *A* in 50 per cent of his total course work (in 45 of the 90 semester hours), and also in 50 per cent of the courses required in his major.
2. He must take at least 60 semester hours in courses beyond the first-group level (numbered above 100).
3. The 90 semester hours of credit must be earned in actual course work, i.e., credit through Advanced Placement, special examinations, etc., may not be counted in the 90 semester hours required for graduation.

Students who qualify for admission to the 90-semester-hour program are encouraged to begin taking second-group courses (numbered 101-200) as soon as they are qualified to do so, and should seek to obtain a waiver of course prerequisites in those disciplines in which they have a strong background.

CURRICULUM REQUIREMENTS

To be recommended by the Faculty for graduation, candidates are required to complete, in addition to the appropriate freshman and sophomore work (see pages 78-80), a minimum of 60 semester hours during the junior and senior years, as set forth in one of the following curricula.

EARNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

For information on earning credit or waiving curriculum requirements, see Columbian College of Arts and Sciences, page 75.

MAJOR FIELDS OF STUDY

Requirements for the five major fields of study leading to the degree of Bachelor of Arts are listed below. Students should consult the appropriate department in the "Courses of Instruction" section of this catalogue for complete course descriptions.

CHINESE LANGUAGE AND LITERATURE

Prerequisite.— A minimum of 60 semester hours in Columbian College (see page 78), or the equivalent from another accredited institution.

Requirements for the Major.—Chin 11–12, 103, 105, 166, and 167; plus 18 additional semester hours of second-group Chinese literature courses. The student is required to pass a major examination at the end of the senior year. The coordinated field of knowledge upon which the student will be examined includes an active command of modern Chinese language and a general knowledge of Chinese literature and culture. A proseminar (199–200) assists the student in preparation for the major examination.

Students in the Chinese Language and Literature program may avail themselves of a junior year abroad, as in the Chinese Studies program (see page 167).

CHINESE STUDIES

The major in Chinese Studies is designed to introduce the student to a non-West-

ern culture and to provide an understanding of the history, politics, and economy of modern China. The major is interdepartmental and is recommended for students who wish a comprehensive study of one of the world's major civilizations and for those who contemplate graduate study in Chinese or Far Eastern Affairs.

A junior year abroad is available in this program of study. Interested students should contact the Chairman of the Department of East Asian Languages and Literatures.

Prerequisite.—The Chinese Studies curriculum, pages 78–79, including Chin 5–6.
Requirements for the Major.—(1) Chin 11, and 166 or 167; (2) Econ 169; (3) 3 semester hours selected from Geog 125, 126, 127, 132, 146, or 161; (4) 6 hours selected from Hist 138, 187, 188, 195, 196 (either Hist 187 or 196, but not both, may be selected); (5) 3 hours selected from P Sc 101, 193, 194; (6) 24 semester hours of related course work in Economics, History, or Political Science, to be selected with the approval of the adviser, of which 6 hours must be a research and writing seminar.

INTERNATIONAL AFFAIRS

The major in International Affairs enables the student to specialize in international political relations, international economics, international communications, or regional studies.

Prerequisite.—The International Affairs curriculum, pages 78–79.
Requirements for the Major.—(1) Econ 181–82; (2) 6 semester hours of a third year of foreign language (may be a literature course taught in the language); (3) 3 semester hours selected from Geog 125, 126, 127, 132, 146, or 161; (4) Hist 150 or 157, and 182; (5) P Sc 171, and 172 or 181; (6) 15 semester hours from one of the Group Options listed below:

Group I. International Politics—courses concerned with theory and practice in international affairs, forces shaping the world scene, and American foreign policy, selected from Geog 125, 126, 127, 146 (if not elected to satisfy the Geography and Regional Science requirement); Hist 138, 139–40, 149, 183; P Sc 107, 111, 112, 117–18, 160, 167, 179, 189 (P Sc 172 or 181 may be elected if not taken to satisfy the major requirement).

Group II. International Economics—courses concerned with the world economy and American policy and practice in international trade and finance, selected from B Ad 176, 178; Econ 101, 102, 104, 121, 122, 134, 147; Geog 125, 126, 127, 132; Stat 111, 112, 122.

Group III. International Communications—courses concerned with the study of international information programs, public opinion, psychological warfare, cultural relations, and public relations, selected from Anth 150, 153, 157, 161, 162; Geog 125; Jour 145, 146; P Sc 146, 167; Psyc 115, 151, 156; Soc 144.

Group IV. Regional Study—a concentration in one of the following areas: (1) Africa—courses selected from Anth 178, 179, P Sc 189, 190, 192; (2) Europe—courses selected from Econ 147, Hist 131–32, 141–42, 147, 149, 151–52, 158, P Sc 111, 112, 117–18; (3) Far East—courses selected from Anth 173, 174, 175, Chin 166, 167, Econ 169, Hist 138, 187, 188, 195–96, P Sc 101, 193, 194; (4) Latin America—courses selected from Anth 170, 172, 185, Econ 185, Geog 161, Hist 163–64, 165, 166, P Sc 177, 178, interdisciplinary seminar 287 offered by six departments participating in the Latin

American Studies program; (5) Middle East—courses selected from Anth 177, Hist 149, 158, 193, 194, P Sc 179, 180, 191, 192, Rel 161; or (6) Soviet Union and Eastern Europe—courses selected from Econ 133, 134, Hist 138, 143, 145, 146, 188, P Sc 112 or 115, 160, 163, Slav 161–62, 165, 166, 193–94.

PUBLIC AFFAIRS

The major in Public Affairs deals with domestic government and policy.

Prerequisite.—The Public Affairs curriculum, page 79.

Requirements for the Major.—(1) Econ 101, 161, 162; (2) Hist 175–76; (3) P Sc 121 or 122, 126 or 151, 145; (4) 12 semester hours from one of the Group Options listed below:

Group I. Economics—courses selected from Econ 102, 104, 121, 122, 123, 136, 142, 165, 181–82.

Group II. Politics—courses selected from P Sc 103, 104, 108, 111, 119–20, 125, 126 (if not taken as a major requirement), 146, 167, 199.

Group III. Urban Affairs—courses selected from B Ad 174; Econ 157; Geog 140, 141, 142; Hum 196; P Sc 103, 104; Soc 126; U&RP 153.

URBAN AFFAIRS

The major in Urban Affairs introduces students to the problems and issues of urban America and develops some of the practical skills necessary for dealing with actual decision-making situations in urban-related occupations. Emphasis is on urban public policy—the forces and processes that shape it and its adequacy in terms of current and anticipated needs.

The student may specialize either in the political and administrative aspects of the policy-making process, or in the analysis and evaluation of specific policy areas. An adviser works closely with each student to develop a program suited to his personal interests and objectives. In his senior year, the student serves an apprenticeship in an urban-related agency or research organization and also attends a weekly seminar in which the work experience is related to a body of academic literature.

Prerequisite.—The Urban Affairs curriculum, page 80.

Requirements for the Major.—(1) Introduction to Urban Affairs: Econ 157 and one additional 3-semester-hour course in Economics, Geog 140, P Sc 104, 151, and one additional 3-semester-hour course in Political Science; (2) Urban Research Methods: Stat 111 and 112, plus two courses selected from Acct 115, P Sc 105, Stat 97, 117, 118, 123; (3) Specialized Topics: three courses selected from B Ad 174, Econ 136, 165, 243, P Ad 246, 249, 250, Soc 147, U&RP 153, 201 (special arrangements necessary to take graduate courses in Public Administration or Urban and Regional Planning); (4) Senior Apprenticeship and Seminar: P Sc 183–84 and 185–86 (the grade of *CR* (Credit) or *NC* (No Credit) will be given for P Sc 185–86). A student may elect to fulfill the apprenticeship requirement in a paid position in lieu of registering for P Sc 185–86; however, the student must substitute 6 semester hours of elective course work.

Because they participate in the senior apprenticeship and seminar, majors in Urban Affairs may not elect courses in the Service-Learning Program.

The Degree of Master of Arts

THIS SCHOOL OFFERS PROGRAMS leading to the degree of Master of Arts in the major fields of International Affairs; Latin American Studies; Public Affairs; Russian Studies; and Science, Technology, and Public Policy.

ADMISSION REQUIREMENTS

Application forms are available from the Graduate Admissions Office, School of Public and International Affairs, George Washington University, Washington, D.C. 20006.

A Bachelor's degree from an accredited college or university, with a *B* average or better, or the equivalent, in the relevant undergraduate major, is normally required. If there is evidence of special promise, such as high GRE scores, an applicant whose academic record falls short of *B* will be given serious consideration. Scores on the Aptitude Test of the Graduate Record Examinations as well as letters of recommendation are required.

In International Affairs.—The applicant's undergraduate program should include background courses corresponding to the interdepartmental undergraduate major in International Affairs at this University (see pages 167-68), or some other relevant social science program. In the case of major deficiencies in the social sciences or international relations, additional course work may be specified beyond the minimum requirements for the Master's degree. The student's particular responsibilities will be indicated in his letter of admission to the program and in the course of subsequent consultation with an assigned faculty adviser.

In Latin American Studies.—The applicant's undergraduate program should include background courses corresponding to an undergraduate major in Latin American Studies at this University (see page 338) or equivalent. Majors in other fields may be considered for admission provided their undergraduate course work includes Spanish or Portuguese and sufficient course work in three of the following six areas: Anthropology, Economics, Geography and Regional Science, Hispanic Literature, History, and Political Science.

In Public Affairs.—An undergraduate major in Public Affairs, Economics, History, or Political Science, depending upon the field of specialization in the Master's program, is required. Students entering the program are assumed to have had some college-level course work in American government and politics, American history, and economic theory. To the extent that a student lacks such a background, he must, in consultation with his adviser, undertake the appropriate remedial course work, including some courses which may be taken for graduate credit.

In Russian Studies.—An undergraduate major in a pertinent field is required. The undergraduate program should have included the following courses, or equivalent: Hist 145, 146; P Sc 112; Slav 1–2 and 3–4, or 5–6.

In Science, Technology, and Public Policy.—Undergraduate majors in a social, life, or physical science, or in engineering are eligible for admission, although those lacking adequate preparation in relevant social sciences may be required to take additional courses; such requirements will be indicated in the letter of admission to the program.

READMISSION

A graduate student who has not maintained continuous registration and has not registered for one or more semesters must file an application for readmission the semester before he wishes to enroll. Applications for readmission are reviewed by the Dean and the Committee on Admission.

GENERAL REQUIREMENTS

There are two options available in all fields leading to the Master of Arts degree except Russian Studies. One requires a minimum of 24 semester hours of approved graduate course work plus the successful completion of a thesis; the student must register for 6 semester hours of *Thesis Research* (299–300). The second option requires a minimum of 36 semester hours of graduate course work and does not include a thesis. In the field of Russian Studies, only the first of these two options, including the thesis, is permitted. The course work for both options is taken in preparation for the Master's Comprehensive Examination.

Candidates for the degree of Master of Arts are required to submit an adviser-approved "Program of Studies" (comprehensive fields, supporting course work, tool requirement, etc.) to the Office of the Dean by the end of the first semester in residence.

Master's degrees are awarded by vote of the Faculty after the student has completed the required course work and an acceptable thesis (if one is elected), has satisfied the foreign language or tool requirement, and has passed the Master's Comprehensive Examination. An applicant whose background does not include the necessary courses or equivalent work experience must take a program longer than the minimum hours required.

Under special circumstances second-group courses (numbered 101–200) may be counted toward the Master's degree when registration for graduate credit has been approved at the beginning of the course by the curriculum adviser, the instructor, and the Dean. The student who takes an undergraduate course for graduate credit is expected, by arrangement with the instructor, to do work at the graduate level in addition to the regular work of the course. Normally, no more than 6 semester hours of second-group courses may be taken for graduate credit in the 30-semester-hour program, and no more than 9 semester hours may be taken for graduate credit in the 36-semester-hour program. No work counted toward a Bachelor's degree may also be counted toward a Master's degree.

All work for a Master's degree must be completed in five years, unless an extension of time is granted by the Dean.

No credit is granted for work done *in absentia* or without formal instruction, except for the thesis, which may be completed *in absentia* with the permission of the curriculum adviser and the Dean. No more than 6 semester hours of graduate credit may be transferred from other accredited institutions or another division of the University, and these may be accepted only under limited conditions of time, grades, and relevance to the student's program.

A student who expects to continue his studies for the degree of Doctor of Philosophy in the field of International Relations after receiving the Master's degree in the field of International Affairs is strongly advised to plan from the

beginning so that work for the lower degree will fit into a subsequent doctoral program in the Graduate School of Arts and Sciences (see pages 90-94, 97-99).

TOOL REQUIREMENTS

In most programs of study a candidate for the degree of Master of Arts must show that he has a reading knowledge (certified by the appropriate language department) of at least one modern foreign language, to be approved by the Dean. A Master's degree candidate whose native language is not English may not select his native language to meet the tool requirement; he may select English to fulfill the requirement with the approval of his adviser and the Dean. The examination is administered by the Department of English.

Candidates in the field of Public Affairs and in the field of Science, Technology, and Public Policy may substitute statistics for a foreign language. This requirement may be met by demonstration of proficiency at the level of Stat 105, 112, or 197.

Candidates in the field of International Affairs may petition the Dean to substitute statistics for a foreign language. The primary basis for approving such petitions will be the relevance of the statistical skills to the student's thesis research.

The language or tool examination should normally be taken before the student has completed the first 15 hours of his work. No student may take the examination more than three times.

Courses taken to fulfill the tool requirement are not counted in the semester-hour requirement for a Master's degree.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to any course examinations, the candidate must pass a written Master's Comprehensive Examination. Examinations are scheduled twice a year (usually in November and April), and should be taken during the last semester of course registration or shortly after the completion of the prescribed course work. If there is a lapse of time between completion of course work and the examination, the student must maintain "continuous registration" during this period. The candidate must consult with his adviser, well in advance, as to the date of his examination and the definition of the subject-matter fields which this examination is to cover. An oral examination on his thesis or major report may also be required.

SCHOLARSHIP

Grades for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; and *CR*, Credit.

An average of *B* or better is required for the Master's degree. The grade of C is not considered as failing but must be counter-balanced by a grade of *A* in a graduate course of equal status.

A Master's candidate who receives a grade of *F* is required to present cause for consideration by the Dean's Council as to why he should be allowed to continue his studies.

Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given to the instructor for the student's

failure to complete the required work of the course. Except for Thesis Research courses, an "Incomplete" cannot be made up after the lapse of one calendar year. An "Incomplete" which is not removed by the end of one calendar year remains as a grade of *I* on the student's record. An "Incomplete" cannot be removed by reregistering for the course.

THE THESIS

The thesis subject should be selected as early as possible so as to permit effective integration with the course work.

The subject must be approved by the student's adviser and the member of the Faculty under whom the thesis is to be written. The thesis in its final form must have the approval of the thesis director *and one other reader*, and two copies must be presented to the Dean by the student no later than the date announced in the Calendar. Printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the period of registration, to the advice and direction of the thesis director and the other reader. In case a thesis is unfinished, an additional calendar year may be granted without further tuition payment. The student must, however, maintain continuous registration (see pages 46-47) during this period. If the preparation of the thesis extends beyond the additional calendar year, *the student must register for the entire 6 hours of thesis again* and pay tuition as for a repeated course.

FIELDS OF STUDY

Specific requirements for each of the five fields of study leading to the degree of Master of Arts are listed below. For prerequisites, see "Admission Requirements," pages 169-70.

INTERNATIONAL AFFAIRS

The interdisciplinary program leading to the degree of Master of Arts in the field of International Affairs provides the student with a wide choice of fields within three broad areas of study: general, supplemental or special, and regional. Graduate courses in Anthropology, Business Administration, Economics, Geography and Regional Science, History, Political Science, Psychology, and Sociology relate to these fields, which are listed below:

General Fields of Study.—International Politics, Comparative Government and Politics, Modern Political Theory (including Socialist and Communist Theory), and International Economics.

Supplementary or Special Fields.—International Law; International Organization and Administration; International Economic Development; International Communications; International and Comparative Aspects of Communism; U.S. Diplomatic History; U.S. Foreign Policy; and Science, Technology, and Public Policy.

Regional Fields.—Modern history, or government and politics, or economic history and problems of one of the following: Western Europe, Eastern Europe, the Soviet Union, Latin America, the Middle East, Africa, South and Southeast Asia, and China. Within each geographical area there are normally three fields of study available.

Each degree candidate must select at least one "general" field. His fields should also represent at least two disciplines. Beyond these limits, the student is free to select any of the fields indicated above as long as they comprise a coherent program. Candidates will be examined on their selected fields of study in the Master's Comprehensive Examination (see page 171).

Candidates who elect to write a thesis must choose *three* of the listed fields and take, in addition to the thesis, a minimum of 24 semester hours of graduate course work in at least two departments, with no more than 15 hours in any one department.

Candidates electing a program without a thesis must choose *four* fields and may take no more than 21 of their required 36 semester hours in one department. They must also include in their program at least two research seminars (6 semester hours) requiring the preparation of substantial research papers.

Courses should be chosen, in consultation with the adviser, with a view to their relevance to the selected fields. It should be understood, however, that course work constitutes only partial preparation for the Master's Comprehensive Examination. Each student is also expected to pursue a program of additional reading in each of his selected fields, in accordance with the advice of the faculty member responsible for instruction in that field.

LATIN AMERICAN STUDIES

The program leading to the degree of Master of Arts in the field of Latin American Studies is designed to provide the student with an appropriate area background in three or four of the following fields: Anthropology, Economics, Geography and Regional Science, Hispanic Literatures, History, and Political Science.

All degree candidates must complete 12 semester hours of graduate work, including the interdisciplinary seminar (287), in a major field selected from those listed above, and 6 semester hours in each of two minor fields selected from those listed above. If a student elects not to write a thesis, he must take 6 semester hours in a third minor field selected from those listed above, and an additional 6 semester hours in any of his fields, major or minor. The tool requirement (see page 171) must be satisfied by demonstration of proficiency in Spanish or Portuguese, or in English if the student's native language is Spanish or Portuguese. The Master's Comprehensive Examination (see page 171) will cover all the student's selected fields.

PUBLIC AFFAIRS

The program leading to the degree of Master of Arts in the field of Public Affairs allows the student to specialize in either domestic economics or domestic politics. The student may select his courses in consultation with an adviser to emphasize either political science, economics, or American history, provided (1) he elects no more than 15 hours of courses in one department under the 24-hour plus a thesis program, or (2) he elects no more than 21 hours in one department under the 36-hour program without a thesis. Course work may include Economics (public finance, monetary theory and policy, labor economics, industrial organization, natural resources and environmental economics, regional and urban economics, economic policy); History (U.S. political history, U.S. economic history, recent U.S. history); Political Science (domestic

politics and government, congress and the presidency, U.S. constitutional law and politics, state and urban politics, political science research methods, and science, technology, and public policy).

RUSSIAN STUDIES

The program leading to the degree of Master of Arts in the field of Russian Studies requires the following courses: Econ 133; Hist 237, 245; P Sc 224, 229, 269; Slav 161-62 or 165 and 166; and *Thesis Research* (299-300). The thesis, which is required of all students in this field, should be interdisciplinary in approach. With the exception of the thesis, students may, with the approval of the adviser, substitute alternate courses for those in the required program.

SCIENCE, TECHNOLOGY, AND PUBLIC POLICY

The program leading to the degree of Master of Arts in the field of Science, Technology, and Public Policy is flexible and is carefully planned and conducted in consultation with an adviser. All degree candidates are required to take 9 semester hours in the core field of science, technology, and public policy, consisting of P Sc 205, P Sc 206 or 208, and a course in methods for the analysis of public policy. A second field must be chosen from one currently offered in the international affairs or public affairs programs of the School. Students who elect to write a thesis must select one additional field, and those who elect not to write a thesis must select two additional fields. The third (and fourth) fields may also be chosen from those currently offered in international affairs or public affairs, or may be interdisciplinary, developed in consultation with the adviser and drawing upon the total resources of the University in order to focus on a particular policy issue or area. Such a special field must be approved by the student's adviser and the Dean.

Combined Master of Arts and Juris Doctor Degree Program

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS cooperates with the National Law Center in offering a program leading to the combined degrees of Master of Arts and Juris Doctor. A student must be accepted for admission by both the School of Public and International Affairs and the National Law Center. Applications should be made separately, but at the same time. Both the School and the Center should be notified that the student is interested in the combined program. The student will be admitted to the School of Public and International Affairs for the academic year following the first year of study at the National Law Center, since the National Law Center stipulates that the first year of course work for the Juris Doctor degree must be taken as a unit.

The Master of Arts degree program normally consists of the 30-semester-hour program which includes a thesis. The student selects a major offered by the School and fulfills all of the requirements for the Master of Arts degree as well as fulfilling the requirements for the Juris Doctor degree. Up to 6

semester hours of credit for course work completed as part of the Juris Doctor curriculum and related to the student's Master's degree program may be approved for transfer toward the Master of Arts degree. (Some of the course work required for the Master of Arts degree progam may be applicable toward the Juris Doctor degree requirements.) Students will be registered in both the School of Public and International Affairs and the National Law Center and must maintain this concurrent registration until all degree requirements have been completed. All work for this combined degree program must be completed in five years, unless an extension of time is granted by the Dean.

Institute for Sino-Soviet Studies

THE INSTITUTE FOR SOVIET-UNION STUDIES provides a program of specialized graduate study and research within the School of Public and International Affairs. Courses of the Institute are drawn from a variety of academic areas and thus provide an interdisciplinary approach to the study of the Soviet Union, Eastern Europe, and East Asia, and of the Communist movement within and among the countries of these areas. Faculty members conduct seminars and reading courses in the disciplines of economics, geography, history, language and literature, law, political science, and psychology.

Students who are preparing for the degree of Master of Arts in the field of International Affairs in the School of Public and International Affairs, or for the degree of Master of Arts in the field of Economics, History, or Political Science in the Graduate School of Arts and Sciences, with specialization in Sino-Soivet Studies, may take one-half of their course work from the Institute's program.

Students working toward the degree of Doctor of Philosophy in International Relations with special emphasis on the Sino-Soviet area are expected to combine work in the Institute with work in the fields of economics, history, and political science. Doctoral candidates in the field of Political Science will take their Sino-Soviet work in the form of appropriate sub-fields of the major and minor fields. Doctoral candidates in the field of History are expected to take at least two of the four fields of the degree in the history of the countries of their specialization. All work leading to the degree of Doctor of Philosophy is under the general supervision of the Graduate School of Arts and Sciences and Consultative Committees designated by that School which direct the work of each graduate student upon admission to degree candidacy. A faculty member of the Institute will serve as adviser to the candidate. The candidate's committee will be formed from members of his disciplinary department. A candidate for such a degree should assume that his committee will require the substitution of a reading examination in Chinese or Russian for one of the two Western languages normally required for the degree.

RESEARCH

Research work is integrated with the teaching program. Members of the research program belong to different disciplines and include not only faculty but also selected graduate students. Research monographs are being published by the Institute.

A special brochure describing in more detail the work of the Institute is available upon request.

INTERUNIVERSITY RESEARCH COLLOQUIA

Scholars from George Washington University, American University, Georgetown University, Howard University, the School of Advanced International Studies of Johns Hopkins University, and the University of Maryland conduct two interuniversity research colloquia. The Colloquium on East Asia is under the chairmanship of Professor Franz Michael; the Colloquium on Russia and Eastern Europe is under the chairmanship of Professor Andrew Gyorgy. Research in progress by members of the colloquia and plans for future research are discussed at weekly meetings. Advanced graduate students can be admitted on approval of the chairman concerned. They receive 3 semester hours of academic credit for each semester of participation, which includes preparation of written work of their own.

DIVISION OF UNIVERSITY STUDENTS

Dean J.G. Allee, Jr.
Assistant Dean B.K. Netland

DEAN'S COUNCIL*

J.G. Boswell, A.H. Desmond, Hewitt Kenyon, R.B. Thompson

INTRODUCTION

THE DIVISION OF UNIVERSITY STUDENTS was established in 1930 to make the regular course offerings of the University more generally available to members of this metropolitan community and to others who are not at the time candidates for degrees in this University. In this Division are registered students who wish to undertake university courses for credit or as auditors. University Students, often employed in government or industry, may be taking courses to increase their vocational fitness or to inform themselves on new developments in the arts and sciences. They may be taking courses as a matter of personal interest for cultural enrichment. Such students may be candidates for higher degrees in other institutions, sent here for special work as part of a graduate program. They may be undergraduates, matriculated in other colleges, taking summer sessions courses only or courses for transfer during the regular academic year with the approval of their own institution. They may be students from institutions outside the Washington metropolitan area enrolling in an appropriate "Washington Semester" program. To serve members of such groups and others not enrolled in degree-granting branches of the University is the function of the Division of University Students.

The privilege of attending George Washington University as a nondegree student is granted on the basis of maturity and proper preparation. Because no degree at George Washington University is involved, there can be no meaningful advisory system in the Division. However, students are invited to seek advice from academic departments. University students are urged to apply to the Office of Admissions for transfer to degree-granting branches whenever such action is appropriate.

All courses except those restricted to medical and law students and those limited to specific degree candidates are open to students in the Division of University Students. Students wishing to take Engineering and Applied Science courses should consult the *School of Engineering and Applied Science* Catalogue.

* The Vice President for Academic Affairs, the Dean and the Assistant Dean of the Division are ex officio members of the Council.

Registration in a given course may be denied students in this Division when space is needed for degree candidates.

An applicant who has been denied admission to any degree-granting branch of the University will not be considered for admission to the Division of University Students for the semester for which the applicant was denied, except upon written recommendation of the dean of the college or school that denied the applicant. However, an applicant who has been denied may be considered in subsequent semesters.

Nondegree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

An applicant who has been suspended from any educational institution for poor scholarship will not be considered for admission to the Division of University Students for one calendar year after the effective date of the suspension.

ENTRANCE REQUIREMENTS*

Good character and an academic background appropriate for the program of studies contemplated are required.

A person not working for a degree at this University will be considered for admission to the Division of University Students to take courses for which he has adequate preparation, as determined by the departments concerned.

Although the deadline for applications for admission to the Division of University Students is the Friday before the first day of registration (see pages 5, 6), applicants are urged to apply earlier because no special exceptions can be made to permit registration for credit after the last day for adding classes (see page 179) even though the requiring of credentials, records, and test scores may delay the action on an application for admission. Insofar as time for full processing permits, applications submitted after the deadline may be considered. Subject to the permission of the department concerned, the deadlines for late registration, adding, dropping, and withdrawal do not apply to auditors.

Scholastic records are required of

1. An applicant who has graduated from high school within the previous two calendar years. Such an applicant must pass designated aptitude tests or meet the following requirements, which are the same as those for admission to Columbian College of Arts and Sciences and the School of Government and Business Administration.

   a) An acceptable certificate of graduation from an accredited secondary school, showing at least fifteen units† which must include four years of English; at least two years of one foreign language; two years of science, preferably with laboratory instruction; two years of social studies, one of which must be American history; and two years of college preparatory mathematics.

   b) The principal's statement that the applicant is prepared to undertake college work.

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* Foreign students, see page 26.

† A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

c) College Entrance Examination Board scores on the Scholastic Aptitude Test and the English Composition Achievement Test.

2. An applicant who has been subject to any form of academic or disciplinary action at any college or university within the previous calendar year.

3. High school students who are applying for the Secondary School Honors Program (see page 181).

4. An applicant who has not completed high school or the equivalent. Such an applicant may be required to take assigned aptitude tests at the University Counseling Center.

Scholastic records may be required of

1. An applicant who has attended any college or university during the previous calendar year.

2. A former student of this University who was on probation or suspended and, since then, has attended another college or university.

3. An applicant who has *ever* been subject to academic or disciplinary action. When scholastic records are required, a student may be admitted for one semester or summer term only, pending receipt of records and under provisions stated by the Office of Admission.

REGULATIONS

Regulations concerning ADMISSION, REGISTRATION, FEES AND FINANCES *are stated on pages 21-32; other University regulations, on pages 43-50.*

Prospective and registered students are urged to acquaint themselves with the regulations concerning "Attendance" (see page 43) and "Withdrawal" (see page 45).

The following specifically applies to all students in the Division of University Students:

Last day to add a class for credit—end of first week of classes.

Last day to drop a class for credit or withdraw from the University—end of the ninth week of classes. (See Calendar for beginning date of classes, pages 5, 6).

Equivalent amounts of time apply to the summer sessions.

ACADEMIC WORK LOAD

The normal academic work load is not more than 10 hours for a student employed more than 20 hours a week and not more than 17 hours for a full-time student. (Hours for courses graded *I*, "Incomplete," will be included in subsequent academic work load.) Exceptions to those limits must be approved by the Dean.

SCHOLARSHIP

A student who fails to maintain the scholarship requirements of this Division may be dismissed from the University.

Normally, any course may be repeated for credit. All grades received in the Division of University Students remain on the record, and scholarship require-

ments are based on the total record. A course taken for audit may not be repeated for credit (see page 46).

GRADES

Undergraduate.—*A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal.

Graduate.—For graduate work, grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal.

The "credit/no credit" option, which permits students to take courses in which they receive the grade of either "Credit" or "No Credit," is not available to students registered in the Division of University Students.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on page 44.

Removing an Incomplete.—Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or a required paper) must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An "Incomplete" cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council. An "Incomplete" which is not removed within one calendar year remains as a grade of *I* on the student's record.

PROBATION AND SUSPENSION

A student taking courses for undergraduate credit is subject to the same "Probation" and "Suspension" regulations as those of Columbian College of Arts and Sciences (page 71).

A student taking any courses for graduate credit must maintain a cumulative quality-point index in these courses of 3.00 or the equivalent. If in 12 hours or more of graduate credit the cumulative (graduate) index falls below 3.00, the student will be placed on probation. If in 12 hours or more of graduate credit, the cumulative (graduate) index falls to 2.25 or below, the student will be suspended.

A student taking (or having taken) some courses for undergraduate credit and taking (or having taken) some courses for graduate credit will be considered on probation if the standards stated above are not maintained in either undergraduate or graduate work. Similarly a student suspended from undergraduate or graduate work is suspended from all work in the Division.

A suspended student will not be permitted to audit a course in the Division during the period of suspension.

CHANGES IN PROGRAM OF STUDIES

Changes within the Division of University Students.—A student may not change or drop courses (see "Withdrawal," page 45) or change his status to that of auditor except with the approval of the Dean.

Change from one section to another of the same course may be made with the approval of the Dean and the department concerned.

Transfer within the University.—Transfer to or from the Division of University Students may be made only with the approval of the deans concerned.

Application for transfer to degree candidacy will be considered only after the completion of at least one semester in the Division of University Students or upon request from the college or school to which the student is seeking admission.

The student wishing to transfer to degree candidacy must meet the conditions of the college or school to which he is applying. It is the responsibility of the student to consult the relevant degree-granting college or school concerning all conditions to be met and the amount of work transferrable.

SECONDARY SCHOOL HONORS PROGRAM

The outstanding secondary school student in the Washington metropolitan area who wishes to enrich his academic background and participate in stimulating college work is encouraged to seek admission to the George Washington University's Secondary School Honors Program. The Honors Student is enrolled in regular college courses of his own choosing appropriate to his level of study, his background, and his aptitude as determined through consultation with his high school counselors and advisers at the University.

Credit earned in the Program is applicable toward a degree at George Washington University should the student later matriculate here. The transfer of credit elsewhere depends upon the policies of the individual schools to which the student might later apply.

Admission to the Honors Program is highly competitive. Normally, only 15 students a semester will be admitted to this Program, and each student will receive a scholarship totaling 50 per cent of his tuition (excluding laboratory and University Center fees). Admission is for one semester only, but students doing well will be given preference for continuation and may be readmitted for a second semester. Criteria for admission are based on a transcript of the student's grades to date, available test scores, evidence of emotional and intellectual maturity, and the results of the interview with the Director.

Application forms and further information may be obtained from B. K. Netland, Director of the Secondary School Honors Program, Division of University Students, George Washington University, Washington, D.C. 20006. No applications will be considered after the Friday before the final day of registration for the semester concerned. For application for the summer session see the *Summer Sessions Catalogue*.

DIVISION OF EXPERIMENTAL PROGRAMS

Director C.C. Mondale

THE UNIVERSITY is committed to the continuous development of new curricular options for its faculty and students. The Division of Experimental Programs (formerly the Office of Program Development) has as its function the support of such curricular experimentation and development. This University-wide curricular development program has three objectives: (1) a more direct relationship between campus and off-campus resources and interests; (2) cooperation among the academic divisions of the University in the development and sponsorship of new courses and programs; and (3) experimentation with new ways of teaching and learning.

Under the auspices of the Division of Experimental Programs, students, faculty, and administrators throughout the University are involved in the planning, teaching, and evaluating of experimental courses and programs. Many such curricular experiments are sponsored by other academic units of the University. There are presently two academic programs directly sponsored by the Division, the Program in Experimental Humanities and the Service-Learning Program.

The Program in Experimental Humanities offers courses which provide opportunities for students to combine sustained field-study with classroom work. These courses are taught by interdisciplinary and interdivisional faculty teams.

The Service-Learning Program integrates supervised work-study with classroom seminars. Students in the Program are assigned to community groups, research organizations, or governmental agencies. Assignments are arranged by means of a formal agreement among the student, the Program, and the off-campus agency.

The Division of Experimental Programs sponsors a special program in curricular development, the GW-Washington Project, which is charged with mobilizing academic resources throughout the University that can appropriately address needs in the Washington communities, particularly the communities of poverty. Among the activities of the Project is a technical assistance program in the Congress Heights-Anacostia area, co-sponsored by the Anacostia Community Development Consortium. The Project, in conjunction with the Spanish Education Development Center, places bilingual students in the Spanish-speaking inner city. A Community Leadership Development Program makes available short-term tuition support for community leaders and offers stipends to selected students for work in community agencies.

The Division of Experimental Programs is funded through grants from the Richard King Mellon Charitable Trusts and from the National Endowment for the Humanities, as well as from the general funds of the University.

ASSOCIATES

Roderick French, *Coordinator, Humanities Development Program*
Gregory Williams, *Coordinator, GW-Washington Project*
Robert E. Cannady, Jr., *Director of Community Relations, GW-Washington Project*

STEERING COMMITTEE

Harold Frederick Bright, *Provost and Vice President for Academic Affairs, Chairman*
Marcella Brenner, *Professor of Education*
James Franklin Burks, *Professor of French*
Ira Hubert Cisin, *Professor of Sociology*
Ralph Clarke Nash, *Professor of Law*
Thomas Eugene Piemme, *Professor of Medicine*
Henry Solomon, *Professor of Economics*

THE SUMMER SESSIONS

Dean W.F.E. Long

DURING THE SUMMER OF 1974, Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Government and Business Administration, the School of Public and International Affairs, the School of Engineering and Applied Science, and the Division of University Students offer courses in two 5-week sessions. The School of Engineering and Applied Science also offers courses in a 7-week period. The National Law Center offers courses in two 6-week sessions and one 13-week session; the School of Education offers courses in a 6- and 9-week session and three 3-week workshop sessions. In addition, a carefully planned group of special programs will be offered to serve a variety of student needs.

For a complete statement concerning summer-term work, see the *Summer Sessions Catalogue.*

OFFICE OF THE VICE PRESIDENT FOR POLICY STUDIES AND SPECIAL PROJECTS

Vice President L.H. Mayo

THE VICE PRESIDENT for Policy Studies and Special Projects is responsible to the President of the University for developing a multidisciplinary University capability for analyzing national policy issues, with involvement by the Consortium universities, foundations, federal agencies, industry, and other organizations having interaction with the governmental process.

Working closely with the Vice President for Academic Affairs, the Vice President for Policy Studies and Special Projects assists in developing faculty research capability for policy studies, recommends the introduction of new curricula in the policy analysis area—in particular at the postgraduate and advanced professional levels—and provides a continuing appraisal of the public advisement function of the University. The Office of the Vice President for Policy Studies and Special Projects serves the University as the locus for discussion and as an advisory resource on interdepartmental and interdisciplinary research related to the analysis of public policies and on curricula pertaining to broad social or environmental problems, in which a number of departments and schools participate.

This Office is responsible for coordinating activities of the Program of Policy Studies in Science and Technology with other policy-oriented projects and programs within the University.

PROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY

The primary objective of the Program of Policy Studies in Science and Technology is to encourage the continuing development of a University policy research capability directed toward the complex issues confronting society. As an integral part of the University, the Program undertakes to serve as an organizing element and to provide a neutral forum for the discussion of policy issues—current and prospective—by representing community groups, and as an advisory and research resource for policy makers in both public and private sectors.

Activities of the Program reflect a number of ways in which a wide range of interdisciplinary talents can be brought to bear upon the analysis of policy problems, particularly those involving the impact of advancing technology on the processes, values, and institutions of society.

By means of the Program of Policy Studies in Science and Technology, George Washington University is moving toward an institutional approach to the policy analysis function as contrasted with the highly fragmented and

largely uncoordinated pattern of "institutes," "centers," and "study groups" which exists at most universities. The Program of Policy Studies concept is novel in its attempt to provide an organization that strengthens the University's ability to address itself to broad issues of public policy. This approach envisages a continuing interaction among the professional staffs of the Program of Policy Studies in Science and Technology, other policy research groups, and other faculty members of the schools and departments of the University.

The following are the primary study areas of the Program:

1. The structure and functions of institutions designed to stimulate, utilize, regulate, and appraise the application of science and technology to the achievement of basic community goals, and to society's needs, national and international.

2. The application of modern research and development management concepts and skills to the planning, programming, and managing of governmental programs and urban social problem areas.

The Program has also undertaken to bring into focus the courses and seminars offered by the University which are directly related to the interface area of science, society, and public policy. An announcement is published every fall.

The Program supports or conducts a number of activities, including studies, monographs, special reports, and professional seminars with government, industry, policy research, and university representatives. An Annual Report of current activities is published in the fall.

Funding sources for the Program of Policy Studies in Science and Technology include, in addition to the University, a basic institutional grant from NASA and grants and contracts from other sources such as the Environmental Protection Agency, the Federal Highway Administration (Department of Transportation), the Office of Education and the Public Health Service (Department of Health, Education, and Welfare), the Department of State, the Department of Housing and Urban Development, the Russell Sage Foundation, the National Science Foundation, the Ford Foundation, and the Cogar Foundation.

PROFESSIONAL STAFF*

Director: Louis H. Mayo, *Vice President for Policy Studies and Special Projects; Professor of Law*

Associate Director: Vary T. Coates, *Senior Staff Scientist and Director, Technology Assessment Group (Political Science)*

Guy Black, *Senior Staff Scientist; Professor of Business Economics*

Dennis W. Brezina, *Senior Staff Scientist (Political Science)*

James M. Brown, *Senior Staff Scientist; Professor of Law*

Thomas Carter, *Research Assistant, Graduate Program in Science, Technology and Public Policy*

Richard F. Ericson, *Senior Staff Scientist; Professor of Management*

Joseph V. Foa, *Professor of Engineering and Applied Science*

Mark S. Frankel, *Assistant to the Director, Graduate Program in Science, Technology, and Public Policy*

Charles E. Hansen, *Consultant, Innovation, Information, and Analysis Project*

Audrey D. Hassanein, *Research Information Specialist*

* Staff listing consists of members who allocate all or a substantial portion of their effort to Program activities. Directors and members of the staffs of other policy study groups in the University participate in the various seminar series, conferences, and other activities of the Program.

Guenther Hintze, *Consultant, Electrical Engineering*
Mary A. Holman, *Associate Professor of Economics*
George E. Humphries, *Consultant (Business Administration)*
Charles Lamb, *Research Associate, NASA ERTS—Land Use Project*
James Lester, *Research Assistant (Political Science)*
John M. Logsdon, *Research Scientist; Director, Graduate Program in Science, Technology, and Public Policy; Associate Professor of Public Affairs and Political Science*
Joseph B. Margolin, *Senior Staff Scientist; Director, Educational Policy Group*
Milton C. Marney, *Consultant, Normative Systems Research*
Roy L. Marx, *Research Scientist (Economics)*
Marion R. Misch, *Research Scientist; Deputy Director, Educational Policy Group*
Judith Naiman, *Research Assistant, Educational Policy Group*
Henry R. Nau, *Deputy Director, Graduate Program in Science, Technology, and Public Policy; Assistant Professor of Political Science and International Affairs*
Charlton R. Price, *Consultant, DOT/Urban Mass Transportation Research and Training Project*
Richard Rice, *Research Assistant (Law)*
Judith Russell, *Chief Information Specialist, NSF R&D Innovation Information Center*
Wendy Schact, *Research Assistant (Political Science)*
Nozer D. Singpurwalla, *Associate Professor of Operations Research*
Charles T. Stewart, Jr., *Professor of Economics*
Edward D. Studholme, *Research Associate (Urban and Regional Planning)*
Theodore Suranyi-Unger, Jr., *Senior Staff Scientist (Economics); Research Professor of Economics*
Wesley L. Tennant, *Senior Staff Scientist; Manager, NSF R&D Innovation, Information, and Analysis Project; Manager, DOT/Urban Mass Transportation Research and Training Project*
S. Ann Vlachos, *Senior Document Research Assistant, Innovation Information Center*
Margaret Ware, *Senior Document Research Assistant, Innovation Information Center*
Ernest Weiss, *Senior Staff Scientist (Transportation Programs Specialist)*
Frederick B. Wood, *Research Associate (Management)*
Blaine Yamagata, *Research Assistant (Law)*

ADVISORY COMMITTEE

Chairman: Lloyd H. Elliott, *President of the University*
Vice Chairman: Bernard A. Schriever, *Chairman of the Board, Schriever & McKee, Inc., Washington, D.C.*
Harold F. Bright, *Provost and Vice President for Academic Affairs*
Arthur E. Burns, *Professor Emeritus of Economics*
Joseph L. Fisher, *President, Resources for the Future, Inc., Washington, D.C.*
Lawrence Levy, *President, Interprise, Inc., Framingham, Mass.*
Dwight Waldo, *Albert Schweitzer Professor in the Humanities, Syracuse University*
Reuben E. Wood, *Professor of Chemistry*

CENTER FOR ADMINISTRATIVE JUSTICE

PROFESSIONAL STAFF

Director: Milton M. Carrow, *Visiting Professor of Law*
Director of Education: Robert E. Park, *Professor of Law*

BOARD OF DIRECTORS

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Henry J. Friendly, *Chief Justice, United States Court of Appeals, Second Circuit, New York, N.Y.*
Louis J. Hector, *Attorney, Miami, Fla.*
Louis H. Mayo, *Vice President for Policy Studies and Special Projects* (ex officio member)
Victor G. Rosenblum, *Director, Program in Law and Social Sciences, Northwestern University*
Harold L. Russell, *Attorney, Atlanta, Ga.*
Antonin Scalia, *Chairman, Administrative Conference of the United States* (ex officio member)
Bernard Schwartz, *Webb Professor of Law, New York University*
Frank M. Wozencraft, *Chairman, Section of Administration Law, American Bar Association* (ex officio member)

The Center for Administrative Justice was established by the American Bar Association and became affiliated with George Washington University in September, 1973. It received its initial funding from the American Bar Endowment.

The purpose of the Center is the advancement of administrative justice in society. Its goals are as follows:

to provide educational and training opportunities in the law and related areas involved in the processes of administrative justice;

to engage in basic research in such areas and to undertake particular research projects for governmental and nongovernmental agencies;

to provide a resource for the initiation, exploration, and development of new concepts, methods, and mechanisms for the improvement of the processes of administrative justice;

to foster the development of ethical standards in the public interest among those engaged in the processes of administrative justice;

to establish and maintain a comprehensive library of materials pertaining to the law and law-related areas of administrative justice;

to publish and disseminate the Center's own and other basic and current materials in such areas;

to conduct conferences, seminars, workshops, colloquia, institutes, and other appropriate means for implementing all of the above goals.

The Center commenced its activities in March, 1973, by undertaking

pilot project in the area of "mass administrative justice," as manifested in the field of welfare administration. Concentrating on the so-called "fair hearing" process, it convened a group of 60 academics, administrators, social workers, political scientists, and lawyers to discuss it, and is now following up with training programs for personnel participating in the hearing process.

Future projects in a variety of areas where administrative justice is a significant factor will be modelled on the pilot project. Examples of possible subjects include health administration, zoning, transportation, occupational licensing, and academic discipline.

A second type of project conducted by the Center during its first year was the drafting of a state administrative procedure act at the request of the Law Revision Council of the State of Florida. This was done by a task force of eminent scholars and practitioners who convened at the National Law Center.

The basic program of the Center will consist of a series of intensive courses offered each year during a six- to eight-week period from about May 15th to July 15th at George Washington University and possibly at other institutions. These will include in-depth seminars in specialized areas of administrative law and current problems and techniques of administrative practice.

Other types of activities and projects will be undertaken as the Center develops.

HEALTH STAFF SEMINAR (HSS)

Judith K. Miller, *Director*

The Health Staff Seminar is designed to assist professional staff members employed by the executive and legislative branches of the federal government in the field of health to obtain a more realistic understanding of actual health practices and problems, and to improve communications between Washington-based professional staff members and experts in the field. Exposure to problems and issues facing the entire country is gained primarily through sequenced evening discussions or workshops and, where appropriate, site visits to various localities. Although attendance is primarily limited to Congressional aides and top-level health staff from the many government agencies involved in health, GWU students and faculty can be accommodated on a space-available basis.

INSTITUTE FOR EDUCATIONAL LEADERSHIP

Norman Drachler, *Director, Institute for Educational Leadership*
Samuel Halperin, *Director, Educational Staff Seminar*
Judith Pitney, *Director, Washington Internships in Education*
James Browne, *Coordinator, Associates Program*

The Institute for Educational Leadership of George Washington University was established to meet the need for strengthening existing and potential leadership in American education at all levels of policy formulation and administration. The emphasis is on improving the quality of decision-makers by providing current and promising educational leaders with first-hand experiences as participants in key issues confronting education today.

The selection of promising and highly qualified individuals to take part in various activities is of crucial concern to the Institute. Criteria for selection emphasize performance in leadership situations. In carrying out its selection and training functions, the Institute is adaptive in its approach, continuously testing the efficacy of alternative methods of leadership development.

The objectives of the Institute are carried out under programs and activities of the following types:

1. *Washington Internships in Education* (WIE) with additional participation at several state levels. Each year WIE and its sponsors from public and private agencies bring together a group of young people from widely diverse backgrounds who share the goal of improving American education. WIE interns are given the opportunity to work and study for a year in a unique and intensive learning environment. The program is designed to help them think in policy terms about national and state issues and their relationship to educational and human goals, to become more sophisticated in dealing with the processes of decision-making, and to become more familiar with the structures and procedures of large organizations.

2. *Educational Staff Seminar* (ESS) and the extension of activities at the state level. ESS is designed to assist professional staff members in the field of education, employed by both the executive and legislative branches of the federal government, in obtaining more realistic understanding of actual educational practices and problems, and to improve communications between Washington educational staff members and educators in the field. ESS seeks this increased staff understanding and awareness of contemporary problems in American education through a variety of in-service training seminars and in-the-field personal observations. Emphasis is on developing broad educational understanding and perspective as well as providing wide exposure to current educational problems.

3. *Institute Associates* provide an opportunity for policy-makers in education at the state level to communicate through special seminars with each other and with outside experts on issues of policy formulation and implementation. Some also serve full-time liason and coordinating functions in state government and with the Committee on the District of Columbia of the U.S. House of Representatives. Associates are recruited chiefly from institutions of higher education. Currently, there are Associates in 15 state capitals.

4. *Scholars-in-Residence*. A select group of individuals of national prominence and professional distinction are invited to occupy chairs of educational leadership development. Scholars act as advisers-in-residence to participants in the WIE, ESS, Associates, and other Institute programs and contribute to interdisciplinary areas of educational thought and leadership.

5. *In-service Training Activities*. The Institute also gives emphasis to continuing career development of educational leaders. In accord with this objective, the Institute is developing a continuing series of programs and activities for the benefit of educational leaders from various institutional settings in both the public and private sectors and from various levels of policy formulation, implementation, and administration. While major attention is focused on the national scene, every effort will be made to carry these programs of the Institute to regional and state levels.

SPONSORED RESEARCH

Assistant Vice President for Research C.J. Lange

THE RESEARCH PROGRAMS listed in this section are special programs which are established for the specific purpose of attacking in an academic atmosphere problems proposed by the individual projects or submitted by the sponsoring agency. Cooperation between these programs and the various departments of instruction is as close as the nature and needs of the programs and departments will permit.

BIOMETRIC LABORATORY

Director R.R. Bonato

The Biometric Laboratory, established in the fall of 1960 and currently supported by the National Institute of Mental Health grant program, is engaged in a broad spectrum of psychotropic drug asssesment. The Laboratory assists investigators throughout the United States in planning research and in analyzing data. The majority of these research projects concern the effects of drugs on behavior.

CENTER FOR MANPOWER POLICY STUDIES

Director Sar A. Levitan

The Center for Manpower Policy Studies is devoted to the evaluation of federally-supported manpower, antipoverty, and related programs. The Center is financed by a grant from the Ford Foundation and offers in conjunction with the Department of Economics graduate courses in labor economics and manpower policy.

EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) CLEARINGHOUSE ON HIGHER EDUCATION

Director C.J. Lange
Associate Director Jonathan Fife

The Educational Resources Information Center (ERIC) Clearinghouse on Higher Education was established in the fall of 1968 with the support of the U.S. Office of Education. The Clearinghouse is responsible for the acquisition, evaluation, abstracting, indexing, and dissemination of research reports and other documents dealing with problems and issues in the field of higher education. It also prepares state-of-the-art and review papers related to higher education.

HEALTH STAFF SEMINAR (HSS)

See the Office of the Vice President for Policy Studies and Special Projects, page 189.

INSTITUTE FOR EDUCATIONAL LEADERSHIP

Washington Internships in Education
Educational Staff Seminar
Institute Associates
Scholars-in-Residence
In-service Training Activities

See the Office of the Vice President for Policy Studies and Special Projects, pages 189-90.

INSTITUTE FOR MANAGEMENT SCIENCE AND ENGINEERING

Director W.H. Marlow

The Institute for Management Science and Engineering provides a multidisciplinary environment for innovative graduate teaching and substantial opportunities for research activities and public service under diversified sources of external support. Through its Program in Logistics, the Institute performs research leading to the development of a science in logistics featuring principles and methodology for resource allocation problems in civil affairs and national defense efforts.

MID-ATLANTIC REGION SPECIAL EDUCATION INSTRUCTIONAL MATERIALS CENTER

Director Robert R. Carter
Principal Investigator R.S. Cottrell, Jr.

The Mid-Atlantic Region Special Education Instructional Materials Center (MAR-SEIMC) was established in March, 1967, by the Bureau for Education of the Handicapped, U.S. Office of Education, and George Washington University to collect, organize, and disseminate information and materials about and for the instruction of handicapped children and youth. Providing assistance in the development of similar centers throughout the Mid-Atlantic Region (Delaware, the District of Columbia, Maryland, New Jersey, Pennsylvania, and Virginia) is a major activity. Workshops are conducted both in the Center and in the field. MAR-SEIMC is part of a national network of similar centers.

NATURAL RESOURCES POLICY CENTER

Director Mary Holman

The Natural Resources Policy Center was established in September, 1965, to sponsor faculty and student research in the area of natural resources and environmental quality; to develop and undertake activities that promote undergraduate and graduate education; and to train employees of public resource agencies. The program of the Center focuses particularly on increasing the contribution of the social sciences—economics, planning, and the political in-

tutions of natural resource agencies—so that these disciplines and related lds of knowledge may be brought to bear more fruitfully on contemporary oblems relating to the management and development of natural resources. ie Natural Resources Policy Center, which provides a focus on natural re-urce and environmental quality problems and issues, is an integral part of e Department of Economics in both the design of its research program and courses.

ROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY

ee the Office of the Vice President for Policy Studies and Special Projects, ages 185-87.

OCIAL RESEARCH GROUP

Director I.H. Cisin
Associate Director H.J. Parry

The Social Research Group conducts surveys and experiments with concentration on basic research underlying an approach to the solution of social problems.

COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES OF THIS CATALOGUE, under the alphabetically arranged names of the departments of instruction and special interdepartmental programs, are listed the courses of instruction offered by the University in the academic year 1974-75. The courses as here listed are subject to change. The University reserves the right to withdraw any course announced.

HOURS OF INSTRUCTION

Classes are scheduled in the morning, afternoon, and evening. Evening and daytime sections of the same course are identical, are taught by the same staff of instructors, and carry the same amount of credit. By taking the evening and summer classes and extending the time of study beyond the usual four years, a part-time student may complete the requirements and obtain a degree.

EXPLANATION OF COURSE NUMBERS

First-group courses.—Courses numbered from 1 to 100 are planned for students in the freshman and sophomore years. With the approval of the adviser and the dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisites to advanced courses, but they may not be taken for graduate credit.

Second-group courses.—Courses numbered from 101 to 200 are planned for students in the junior and senior years. Except for Accounting courses, they may be taken for graduate credit only upon the approval of the Dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work in order to receive graduate credit. Accounting courses numbered 101-200 may not be taken for graduate credit.

Third-group courses.—Courses numbered from 201 to 300 in the Graduate School of Arts and Sciences and the School of Government and Business Administration, and courses numbered 201 to 400 in the School of Education, are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are not open to other undergraduates. Qualified seniors in the School of Government and Business Administration registering for these courses must have a 3.00 average, the prior approval of

e department chairman who is responsible for the graduate course, and the ior approval of the Dean. Nondegree students who have not completed a achelor's degree may not enroll in graduate courses offered by the School of overnment and Business Administration.

Fourth-group courses.—Courses numbered 301 to 400 in the Graduate chool of Arts and Sciences are limited to graduate students; but they are pri- arily for doctoral candidates. Courses numbered 301 to 400 in the School of overnment and Business Administration are limited to doctoral students. In e School of Education fourth-group courses, numbered 401 to 500, are mited to graduate students with Master's degrees from accredited institutions.

EY TO ABBREVIATIONS

he following abbreviations are used in this catalogue for course designations.

Acct	Accounting
mCv	American Civilization
Anat	Anatomy
Anth	Anthropology
Ap S	Applied Science
Art	Art
A Th	Art Therapy
Bioc	Biochemistry
B Sc	Biological Sciences
B Ad	Business Administration
Chem	Chemistry
Chin	Chinese
CE	Civil Engineering
Clas	Classics
Econ	Economics
Educ	Education
EE	Electrical Engineering
Engl	English
E Ad	Engineering Administration
Envr	Environmental Studies
Epid	Epidemiology and Environmental Health
Hum	Experimental Humanities
ForS	Forensic Sciences
Fren	French
Gnet	Genetics
Geog	Geography and Regional Science
Geol	Geology
Germ	Germanic Languages and Literatures
HCA	Health Care Administration
Hist	History
HonP	Honors Program—Columbian College
Ital	Italian
Jap	Japanese
Jour	Journalism
Mgt	Management Science
Math	Mathematics
Micr	Microbiology
Mus	Music
OR	Operations Research
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
PE	Physical Education, Health, and Recreation
Phys	Physics
Phyl	Physiology
P Sc	Political Science
Port	Portuguese
Psyc	Psychology
P Ad	Public Administration
Rel	Religion
SHum	Service-Learning Experimental Humanities
SPSc	Service-Learning Political Science
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
S Ed	Special Education
Sp&D	Speech and Drama
Stat	Statistics
U&RP	Urban and Regional Planning
W St	Women Studies

EMESTER HOURS OF CREDIT

The number of semester hours of credit given for the satisfactory completion of a course is, in most cases, indicated in parentheses after the name of the

course. Thus, a year course giving 3 hours of credit each semester is marked (3–3), and a semester course giving 3 hours of credit is marked (3). A semester hour usually consists of the completion of one fifty-minute period of class work or of one laboratory period a week for one semester.

TIME OF COURSE OFFERINGS

Following most course descriptions is a parenthetical statement listing the semester (fall or spring) for which the course is scheduled for 1974-75. The term "academic year" is used only with two-semester courses, and indicates that the first half of the course is to be offered in the fall semester and the second half in the spring semester. If no parenthetical statement appears, the course is not scheduled to be offered during the fall or spring semesters of 1974-75. Offerings for the summer sessions are not designated in this catalogue. Students should consult the *Summer Sessions Catalogue* or *Schedule of Classes* for summer offerings. A *Schedule of Classes* is also published for each fall and spring semester which provides more exact and up-to-date information concerning the time of course offerings.

Accounting

Professors E.J.B. Lewis, A.J. Mastro (*Chairman*)
Professorial Lecturers M.P. Pujol, Leo Herbert, Shawki Farag
Associate Professors F.C. Kurtz, Chei-Min Paik, M.G. Gallagher
Associate Professorial Lecturer Joseph Hilmy
Assistant Professor R.S. Coyner, Jr.
Assistant Professorial Lecturer E.J. Shuchart

Bachelor of Business Administration in the field of Accounting.—See pages 134-40
Master of Business Administration with a field of concentration in Accounting.—**Prerequisite: a Bachelor's degree, see pages 144–45.**

Required: the general requirements, pages 145–48. A "common body of knowledge" in business administration is required of all candidates; this knowledge may be obtained as part of an undergraduate degree in business or as part of the total Master of Business Administration degree program at this University. The "common body of knowledge" may be satisfied by the following courses at this University or the equivalent: Acct 115; B Ad 131, 141, 161, 198; Econ 1; Mgt 118; and Stat 111. In addition to this requirement the student's program of study will consist of (1) the "Required Courses in Administration," including Acct 276 (see pages 146–47); (2) Acct 262, 295, B Ad 231; (3) (a) for students not electing a thesis—Acct 275, 282, 297, and 6 semester hours of elective, or (b) for students electing a thesis—Acct 275 or 282, and Acct 299, 300, and 6 semester hours of elective. Acct 215 must be taken in place of Acct 275 or 282 if a course in cost and budgetary control was not taken prior to entering the M.B.A. degree program. Elective courses are selected, with the approval of the adviser, from courses in other fields offered by the School; however, no more than 3 hours may be in one field, and none of the courses may be in Accounting.

Programs of study in Accounting leading to the degrees of *Doctor of Business Administration* and *Doctor of Public Administration.*—See pages 156-58.

Accounting courses numbered below the 200 level may not be taken for graduate

redit. Accounting courses numbered 201 and above may not be taken for undergraduate credit.

IRST GROUP

1–2 **Introductory Accounting** (3–3) Gallagher, Kurtz

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communications of significant economic and financial data. Prerequisite to Acct 2: Acct 1. Students who have received credit for Acct 115 cannot receive credit for Acct 1–2. (Acct 1 and 2—fall and spring)

ECOND GROUP

101 **Cost and Budgetary Control** (3) Coyner, Farag

Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 215 cannot receive credit for Acct 101. (Fall and spring)

111 **Financial Statement Analysis** (3) Farag, Hilmy

Analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2. (Spring)

115 **Survey of Financial Accounting** (3) Gallagher

Development, presentation, and interpretation of financial accounting data necessary to the management process. Students who have received credit for Acct 1–2 cannot receive credit for Acct 115. (Fall and spring)

121 **Intermediate Accounting** (3) Mastro

In-depth study of accounting functions and basic theory; acquisition of assets and services, income and equity accounting, preparation and analysis of financial statements. Prerequisite: Acct 1–2. (Fall)

122 **Intermediate Accounting** (3) Kurtz

An in-depth study of special topics: partnership, consignment, installment, liquidation, retail, estate, and trust accounting. Prerequisite: Acct 121.

132 **Accounting Theory** (3) Mastro

Current thought as reflected in the pronouncements of leading professional and accounting research associations, major contributions to accounting literature. Prerequisite: Acct 121. (Spring)

141 **Governmental Accounting** (3) Lewis, Pujol

Appropriation, encumbrance, and fund accounting for governmental and institutional entities. Prerequisite: Acct 1–2. (Fall)

144 **Federal Accounting** (3) Lewis

Accounting procedures in the federal government, with emphasis on agency-level accounts and accounting support for cost-based budgets. Prerequisite: Acct 141.

161 **Federal Income Taxation** (3) Gallagher

Federal income tax concepts applicable to individuals and corporations,

differences between tax accounting and financial accounting. (Fall and spring)

162 **Tax Research and Planning** (3) Gallagher

Substantive federal tax provisions relating to corporations, partnerships, security transactions, estates, gifts, and pension and profit-sharing plans; emphasis on tax research and tax-planning objectives.

171 **Auditing** (3) Kurtz

Principles and procedures of auditing: generally accepted auditing standards, internal control, audit objectives and reports, form-preparation-use of audit work papers, audit evidence. Prerequisite: Acct 121. (Fall)

172 **Audit Planning and Control** (3) Kurtz

Standards of audit reporting and other current auditing topics, including application of statistical sampling techniques to auditing, auditing electronic systems, and management advisory services. Prerequisite: Acct 171.

181 **Accounting Systems** (3) Coyner, Hilmy

Organization and use of accounting information: origination, classification, control, and reporting; development, design, and installation of accounting systems; accounting communication patterns. Prerequisite: Acct 101, 171. (Spring)

191 **Advanced Accounting** (3) Gallagher

Application of accounting theory to special areas: consolidated statements, business combinations, earnings per share, foreign exchange, price-level adjusted statements, source and application of funds. Prerequisite: Acct 121. (Spring)

193 **Business Budgeting** (3) Lewis, Paik

Principles and procedures in the development, installation, and operation of a system of budgetary control to aid management. Prerequisite: Acct 1–2. Students who have received credit for Acct 101 cannot receive credit for Acct 193. (Fall and spring)

196 **Management Decisions and Accounting** (3) Paik

Analysis of data required in capital budgeting, inventory management, and other decisions; cash-flow and probability data; advanced cost accounting systems. Prerequisite: Acct 101.

199 **Accounting Practice Internship** (3) Mastro

Concepts, procedures, and standards of auditing practice obtained as an intern with a firm or agency. Prerequisite: 15 semester hours of Accounting courses (including a course in auditing), senior status, and approval of the Chairman of the Department.

THIRD GROUP

215 **Survey of Managerial Accounting** (3) Paik, Herbert

Study of the nature, analysis, and interpretation of accounting reports primarily from the management point of view. Prerequisite: Acct 1–2 or 115. Students who have received credit for Acct 101 cannot receive credit for Acct 215. (Fall and spring)

231 **Contemporary Accounting Theory** (3) Mastro

Accounting principles and concepts and recent theories concerned with the valuation and amortization of assets and determination of income. Prerequisite: 6 semester hours of accounting.

241 **Accounting and Related Disciplines** (3) Paik

Interrelationships of accounting and behavioral sciences, economics, mathematical methods, operations research. Prerequisite: 6 semester hours of accounting.

245 **Decision Systems and Accounting** (3) Paik

Limited to students in the Navy Graduate Financial Management Program. Managing financial and related information systems in complex organizations; relationships between accounting in its broadest sense and management control and decision systems. (Spring)

246 **Governmental Accounting and Budgeting Problems** (3) Lewis

Current problems in federal financial planning, programming, budgeting, accounting, and auditing. Prerequisite: Acct 144.

262 **Business Income Taxation** (3) Gallagher

Federal income tax concepts applicable to corporations, partnerships, and their owners; emphasis on tax planning factors in business decisions and tax research. (Fall)

275 **Contemporary Auditing Theory and Procedures** (3) Kurtz

Study of generally accepted auditing standards: internal control and internal auditing, application of statistical sampling to auditing, audit of electronic data processing systems. Prerequisite: Acct 1–2 or 115. (Spring)

276 **Management Planning and Control** (3) Paik, Herbert

Integrative case study approach to management systems for planning, control, and decisions: value indices for organizational sub-units, transfer pricing, contemporary control systems, accounting framework and cycle. Prerequisite: Acct 1–2 or 115. (Spring)

282 **Accounting Information Systems** (3) Coyner

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 1–2 or 115. (Spring)

292 **Professional Accounting Review** (3) Lewis

Review and coordination of principles and techniques in preparation for general practice in the field of accountancy and for professional accounting examinations. Prerequisite: Acct 101, 141, 161, 171, and 191.

295 **Seminar in Accounting** (3) Mastro

Selected accounting studies: critical analysis and evaluation developed in seminar discussions and papers. Prerequisite: Acct 1–2 or 115. (Spring)

297 **Accounting Research Methodology** (3) Coyner

(Spring)

299 **Thesis Seminar** (3) Mastro and Staff
(Fall and spring)

300 **Thesis Research** (3) Mastro and Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Mastro and Staff
Limited to students preparing for the Doctor of Business Administration or Doctor of Public Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Mastro and Staff
Limited to Doctor of Business Administration or Doctor of Public Administration candidates. May be repeated for credit. (Fall and spring)

American Literature

See "English."

American Studies Program

Professors R.H. Walker, Jr., C.C. Mondale, Letitia Brown
Associate Professorial Lecturer James Mahoney, Jr.
Assistant Professors H.F. Gillette, Jr. (*Director*), B.M. Mergen
Special Lecturer Lillian Miller

FACULTY ADVISORY COMMITTEE

B.M. Mergen (*Chairman*), C.W. Cole, C.E. Galbreath, F.S. Grubar, H.L. LeBlanc, C.H. Pfuntner, R.P. Sharkey, R.W. Stephens, Dewey Wallace, Jr.

AMERICAN STUDIES COUNCIL

The Council serves the American Studies Program in an advisory capacity from several points of view, as follows:

From the Washington Community

Aaron Goldman, *President, Macke Vending Co.*
Laughlin Phillips, *Editor,* The Washingtonian
Sterling Tucker, *Vice Chairman, District of Columbia Council*

From the Student Body

Two undergraduate students; two graduate students.

From the Alumni

C. Robert Kemble

From Affiliated Programs

Robert H. Land (Library of Congress)
Atlee Schidler (Washington Center for Metropolitan Studies)
Wilcomb E. Washburn (Smithsonian Institution)

From the Faculty

The American Studies staff of instruction and the Faculty Advisory Committee, ex officio

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Bachelor of Arts with a major in American Civilization (Field-of-Study).—The following requirements must be fulfilled.

1. The general requirements stated on pages 73, 80–86.
2. Prerequisite course—AmCv 71–72. (In preparation for the major field it is recommended that students elect introductory courses in Anthropology, Art, Economics, English, Geography and Regional Science, History, Philosophy, Political Science, Religion, and Sociology.)
3. Required courses in the major—(a) 15 semester hours of approved second-group courses in the Humanities (History may be elected for (a) or (b), but not for both); (b) 15 semester hours of approved second-group courses in Social Studies; (c) AmCv 179–80, which must be taken in the senior year.
4. In addition to the "meaningful initiation" requirement (see page 73), students must elect 3 or 4 additional semester hours in the Natural and Mathematical Sciences or in Geography and Regional Science.

The major examination required of all seniors must be satisfactorily completed in the first semester of the final year.

Two years of a foreign language or adequate preparation in statistics, logic, or linguistics is strongly recommended. Students should consult frequently with an American Civilization adviser.

Master of Arts in the field of American Civilization.—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in American Civilization or in the subject in which concentration is contemplated.

Required: the general requirements, pages 90–97, including (1) AmCv 271–72 (6 semester hours), a seminar in the methods and materials for teaching and research in American Civilization; (2) 18 additional semester hours in a carefully related pattern, focusing in a concentrated approach to the study of American Civilization; (3) a Master's thesis (6 semester hours) written on an approved topic under the direction of the instructor in whose field the major emphasis falls; (4) a Master's Comprehensive Examination reflecting the candidate's area of concentration.

Doctor of Philosophy in the field of American Civilization.—This program combines work in the humanities and/or social sciences as preparation for research and teaching, with the option of stressing preparation for museum and library careers. Applicants are required to have an adequate background in the humanities and/or social sciences as they apply to the understanding of American civilization.

Required: the general requirements, pages 90–94, 97–99. Candidates must pass a General Examination in four areas. An area in American Cultural History and an area in the culture of some area outside the United States (i.e., English Literature, European History) are required. The other two areas may be chosen from the following groups: (1) American Diplomatic, Economic, Political, or Social History; American Literature, Art, Philosophy, or Religion; Afro-American History; or some

areas of the social and behavioral sciences; (2) in affiliation with the Library of Congress—supervised historical study in bibliographic resources including American History and Politics, Cartography, Cross-cultural Studies, Government Documents, Graphic Arts and Music, Motion Pictures and Recorded Sound, Printing and Bookmaking; (3) in affiliation with the Smithsonian Institution (Museum of History and Technology, National Portrait Gallery, and National Collection of Fine Arts)—supervised studies including Architectural History, Ethnohistory, Historical Archaeology, History of Science, History of Technology, Industrial Archaeology, Material Aspects of American Civilization, and various fields in the History of Art. Additional areas of study may be arranged within the University and in both the Library of Congress and Smithsonian cooperative programs. Special announcements concerning these programs are issued periodically and are available in the Office of the Director of the American Studies Program.

Research fields for the dissertation may be chosen from any of the above except those dealing with the culture of an area outside the United States.

AMERICAN CIVILIZATION

FIRST GROUP

71–72 **Introduction to American Civilization** (3–3) Mergen, Gillette

Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance. (Academic year)

SECOND GROUP

161–62 **Studies in American Literature** (3–3) Sten

Same as Engl 161–62. Major factors in the national cultural tradition as shown by outstanding writers. (Academic year)

179–80 **Proseminar in American Civilization** (3–3) Mergen, Walker, Mondale

Coordinating course for seniors majoring in American Civilization. (Academic year)

188 **Urban Issues** (3) Gutheim

Urbanization as a process. Population, life styles, planning, and land (Spring)

*192 **The American Cinema** (3) Mergen

History and criticism of American films. The course will enable the student to develop an ability to see and evaluate cinema techniques, to express the evaluation clearly in writing, and to understand the role of films in the context of American culture. The American Film Institute's Rediscovery Series will be used as a laboratory. Subscription to the Series is $15, payable to the American Film Institute.

195 **Independent Study** (3) Staff

Open to a limited number of American Civilization majors with approval of instructor. (Fall and spring)

* Joint offering of the American Studies Program and the Department of Speech and Drama.

THIRD GROUP

*225 **History of Washington, D.C.** (3) — Brown

271–72 **Seminar: Research and Teaching in American Civilization** (3–3) — Gillette

Consideration of American studies as an area for research and teaching; introduction to bibliography. Required of candidates for the degree of Master of Arts in the field of American Civilization. (Academic year)

*273–74 **Research Seminar: Materials in Afro-American Culture** (3–3) — Brown

Prerequisite Hist 173–74 or equivalent. (Academic year 1975–76 and alternate years)

280 **Seminar: Urban History** (3) — Gutheim

(Spring)

281 **Seminar: Early American Literature** (3) — McCandlish

Same as Engl 281.

289–90 **Seminar: Topics in American Civilization** (3–3) — Mondale

Research problems selected by the instructor. Preparation in American Cultural History or other area appropriate to the topic of the seminar. (Academic year)

295 **Independent Study** (arr.) — Staff

Limited to Master's candidates. Permission of instructor, in writing, required. (Fall and spring)

299–300 **Thesis Research** (3–3) — Staff

(Fall and spring)

FOURTH GROUP

*373–74 **Readings on the Negro in American Culture** (3–3) — Brown

For students preparing for the Doctor of Philosophy general examination in the field of the Negro in American Culture. (Academic year 1974–75 and alternate years)

379–80 **Readings in American Cultural History** (3–3) — Walker

For students preparing for the Doctor of Philosophy general examination in the field of American Civilization. (Academic year)

398 **Advanced Reading and Research** (arr.) — Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) — Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

COURSES OFFERED IN AFFILIATION WITH THE LIBRARY OF CONGRESS

The Graduate School of Arts and Sciences is affiliated with the Library of Congress

* Joint offering of the American Studies Program and the Department of History.

in a program leading to the degree of Doctor of Philosophy. The following courses are offered at the Library of Congress by members of its staff:

THIRD GROUP

255–56 **Research Orientation Seminar: Americana in the Library of Congress** (3–3)
Examination of the collections of the Library of Congress with the aim of increasing understanding of American culture and awareness of library-oriented research problems and possibilities. For students in the affiliated doctoral program, this course may lead directly to a field in "Reseach Materials for the Study of American Life: Their Content, Collection, Arrangement, and Use." (Academic year 1975–76 and alternate years)

FOURTH GROUP

355–56 **Seminar: Advanced Library Research** (3–3)
Introduction to practical problems of research in librarianship and control of collections. Supervised study in selected subject fields; emphasis on collections in the Library of Congress and concentrated work in a special collection. Prerequisite: AmCv 255–56. (Academic year)

389 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination in fields offered in affiliation with the Library of Congress. May be repeated for credit. (Fall and spring)

390 **Dissertation Research** (arr.)
For Doctor of Philosophy candidates preparing dissertations based upon or significantly related to collections of the Library of Congress. Supervised by specialists at the Library. Prerequisite: AmCv 355–56. (Fall and spring)

COURSES OFFERED IN AFFILIATION WITH THE SMITHSONIAN INSTITUTION

The Graduate School of Arts and Sciences is affiliated with the Smithsonian Institution's Program for Graduate Students in the History of American Civilization. The following courses are offered at the Museum of History and Technology and at the National Portrait Gallery, by members of their staffs:

THIRD GROUP

250 **Orientation Course: Material Aspects of American Civilization** (3)
Familiarization with the historical collections of the Smithsonian Institution and introduction to opportunities for research and publication based on historical objects. Required of all students in the Master's and doctoral programs affiliated with the Smithsonian Institution. (Fall)

251–52 **Museum Research and Education** (3–3) Washburn and Staff
Supervised work and/or study under the direction of Smithsonian staff members and research associates—museum visitor behavior, costumes and furnishings, and photography as historical documentation.

*270 **Seminar: Museum Exhibiting** (3) Mahoney

Selected museum exhibiting problems in the social and natural sciences, including methods and techniques of exhibition, problems of museum communication, education, etc. (Fall)

†284 **Seminar: Studies in American Art and History** (3) Miller

Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. (Spring)

‡294 **Field Research in Historical Archaeology** (3)

Field techniques, including excavation, recording, photography, preservation, laboratory analysis and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md.

FOURTH GROUP

351–52 **Research in Selected Aspects of American Civilization** (3–3)

Supervised study and/or field work in selected subject areas related to the activities of the Smithsonian Institution. Prerequisite: AmCv 250. (Academic year)

394 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination in fields offered in affiliation with the Smithsonian Institution. May be repeated for credit. (Fall and spring)

395 **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations significantly related to the material aspects of American civilization. Students work under curatorial supervision at the Smithsonian Institution. Prerequisite: AmCv 351–52. May be repeated for credit. (Fall and spring)

Anatomy

Professors Paul Calabrisi (*Emeritus*), C.M. Goss (*Visiting—Medical History*), F.D. Allan, T.N. Johnson, R.S. Snell (*Chairman*)
Professorial Lecturers J.L. Angel, T.S. Reese
Associate Professors E.N. Albert, Marilyn Koering
Associate Professorial Lecturers J.A. Di Paolo, Joan Blanchette-Mackie, Kathleen Weston
Assistant Professors Ann Butler, D.E. Morse, M.D. Olson, J.M. Kerns
Special Lecturer Mary Ericksen

* Joint offering of the American Studies Program and the Department of Anthropology.
† Joint offering of the American Studies Program and the Department of Art.
‡ Joint offering of the American Studies Program and the Department of Anthropology in cooperation with St. Mary's College, the Smithsonian Institution, and the St. Mary's (Md.) City Commission.

Doctor of Philosophy in the field of Anatomy.—Required: the general requirements, pages 90–94, 97–99. Candidates must fulfill the tool requirement by passing a reading knowledge examination in French and German or by passing the examination in one of these languages and satisfactorily completing the tool requirement in Biostatistics. The General Examination must cover at least four fields, two of which must be in anatomical disciplines.

Research fields: Cell Ultrastructure, Embryology, Gross Anatomy, Histology, Human Genetics, Neuroanatomy, and Physical Anthropology.

202 **Gross Anatomy** (6) — Snell and Staff

Regional dissections of adult cadaver supplemented with lectures and X-rays. Laboratory fee, $30. (Fall)

203 **Human Embryology** (1) — Allan

Origin and development of human body; emphasis on value of embryology in interpreting anatomical anomalies. (Fall)

204 **Neuroanatomy** (2) — Johnson, Butler

Gross and microscopic anatomy of central nervous system and special senses. Laboratory fee, $13. (Fall)

205 **Human Microscopic Anatomy** (3) — Albert and Staff

(Formerly Microscopic Anatomy)

Microscopic structure of cells, tissues, and organs of the human body. Laboratory fee, $20. (Fall)

206 **Electron Microscopic Histochemistry** (3) — Albert

Experimental study of electron histochemical techniques. Prerequisite: Anat 205 or equivalent. Laboratory fee, $30. (Spring)

208 **Comparative Vertebrate Neurology** (1) — Butler, Johnson

Survey of the evolution of the vertebrate brain. Prerequisite: Anat 204. Laboratory fee, $10. (Spring)

209 **The Use of Audio-visual Techniques in Anatomy** (2) — Allan

Preparation of a significant audio-visual program of some aspect of human anatomy. Laboratory fee, $20. (Spring)

210 **The Use of Computers in Anatomy** (2) — Snell

Applying computer techniques to the problems of learning anatomy. Limited enrollment. Laboratory fee, $20. (Spring)

221–22 **Seminar** (1–1) — Koering

Research reports and discussions of special topics by staff and students. (Academic year)

249 **Introduction to Anatomical Research** (1) — Staff

Major research techniques as applied to bilogical materials in the various anatomical disciplines. (Fall)

252 **Physical Anthropology** (1) — Angel

Variations in man and factors affecting him, human evolution and racial differences, anatomy and culture of ancient man. (Spring)

254 **Fetal Anatomy** (2) — Allan

Dissection of early and late human fetus. Comparison of fetal and adult structures. 20 students. Laboratory fee, $10. (Spring)

256 **Human Genetics** (1) — C. B. Jacobson

General principles of genetics, new cytogenetics techniques, aneuploidy in man and its significance, biochemical aspects of heredity, genetic counseling. (Spring)

258 **Cell Biology** (3) — Albert and Staff

(Formerly Cytology)
Detailed study of morphology and function of the cell and its organelles. Basic cytological techniques emphasized. Laboratory fee, $20. (Spring)

260 **Electron Microscopy in Cellular Biology—Lecture** (1) — Koering

Introduction to the morphology of the cell and its components. (Spring)

261 **Electron Microscopy in Cellular Biology—Laboratory** (2) — Koering

Introduction to the routine processing of specimens; preparation and interpretation of micrographs. Limited enrollment. Admission by permission of instructor. Prerequisite or concurrent registration: Anat 260. Laboratory fee, $15. (Spring)

262 **Gross Anatomy of Upper and Lower Extremities** (2) — Snell and Staff

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

264 **Gross Anatomy of Head and Neck** (2) — Snell

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

266 **Gross Anatomy of Thorax and Abdomen** (2) — Snell

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

268 **Gross Anatomy of Pelvis, Perineum, and Lower Extremity** (2) — Snell and Staff

Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

270 **Dissection of the Human Brain** (1) — Johnson

Dissection of major pathways and nuclei of the brain with consideration of ventricular system; conferences and assigned reading. Limited enrollment. Laboratory fee, $10. (Spring)

272 **Autonomic Nervous System** (1) — Allan

Development, microscopic and gross anatomy, function of central and peripheral components of autonomic nervous system. (Spring)

274 **Tissues of the Body** (1) — Snell

Selected tissues of the human body considered in depth. (Spring)

precepts to current environmental problems. (Fall 1974 and alternate falls)

153 **Psychological Anthropology** (3) McKay

Relevance of psychological theories to human evolution and the cross-cultural study of personality. Cultural determinants of personality formation and mental health. (Fall)

154 **Mythology and Folklore** (3) Golla

Traditional verbal expression of supernatural or social beliefs; metaphorical thought; verbal art. (Fall)

155 **Primitive Religion** (3) Simons, Golla

Conceptions of the supernatural in nonliterate societies. Examination of religious beliefs and practices. Emphasis on religious process and change. (Spring 1976 and alternate springs)

156 **Comparative Political and Legal Systems** (3) Simons

Cross-cultural study of ancient and modern systems of social control: moral, ethical, and legal factors which operate to produce behavioral norms. (Spring 1975 and alternate springs)

157 **Primitive Social Organization** (3) Simons

The analysis of the social organization of primitive peoples; kinship, economic, and political systems. (Fall)

158 **Art and Culture** (3) Krulfeld

Study of the art of tribal society, including the role of art in culture, influences upon the artist, and beliefs and practices associated with art production. (Fall or spring)

159 **Ethnography of Knowledge** (3) Golla

The organization of empirical knowledge in literate and nonliterate societies. Processes of hypothesis, deduction, and classification. (Fall 1975 and alternate falls)

161 **Language and Culture** (3) Golla

Structure and semantics of systems of human communication; linguistic change; social aspects of language. (Fall)

162 **Linguistics in Anthropology** (3) Golla

Introduction to general (descriptive and comparative) linguistics. (Spring)

170 **Cultures of the Caribbean** (3) Lewis

Study of the culture history and ways of life of the various cultural groups of the area up to the ethnographic present. (Spring 1976 and alternate springs)

171 **Native Peoples of North America** (3) Simons, Humphrey

Comparative study of Indian groups representative of each of the culture areas of the continent. (Spring 1975 and alternate springs)

172 **Native Peoples of South America** (3) Stuart

Survey of Indian groups representative of each of the culture areas of the

continent. Hacienda, plantation, and urban adaptations of Indian and African groups. (Fall 1974 and alternate falls)

173 **Cultures of the Pacific** (3) Lewis

Study of the culture history and ways of life of the native peoples of Melanesia, Micronesia, and Polynesia. (Fall 1974 and alternate falls)

174 **Far Eastern Communities** (3) Krulfeld

Study of social organizations, religions, economies, and problems of current anthropological interest for cultures of the Far East, including Japan, Korea, China, and India. (Spring 1975 and alternate springs)

175 **Cultures of Southeast Asia** (3) Krulfeld

Study of representative Southeast Asian cultures from nonliterate societies to high civilizations. (Fall 1975 and alternate falls)

176 **Cultures of the Circumpolar Region** (3) Humphrey

Survey of the social and economic adaptations to an extreme climate made by peoples of the northern subarctic and arctic regions of North America and Eurasia. (Spring)

177 **Cultures of the Near East** (3) Lewis

Study of the geographic environment, language, religion, and social structure of settled and nomadic peoples of the Near East; emphasis on the Arab world. (Spring 1975 and alternate springs)

178 **Cultures of South and East Africa** (3) Lewis

Comparative examination of the history, cultural development, and contemporary problems of cultures of southern and eastern Negro Africa. (Fall 1975 and alternate falls)

179 **Cultures of West and Central Africa** (3) Lewis

Comparative examination of the history, cultural development, and contemporary problems of cultures of western and central Negro Africa. (Spring)

182 **New World Archaeology** (3) Humphrey

Introduction to archaeological methodology, theory, and survey of North American culture history from man's entry into the Americas during the Pleistocene period until the time of the first European contacts. (Spring)

183 **Old World Prehistory** (3) Brooks

(Formerly Old World Archaeology)

Specific area and periods to be announced in the *Schedule of Classes*. Survey of human prehistory in Europe, Africa, and Asia from the earliest hominid cultures to the beginnings of advanced civilizations and their secondary centers. May be repeated for credit with permission of instructor. (Fall)

184 **Ethnohistory** (3) Stuart

Cultural reconstruction of behavioral and ideological patterns of past societies. Specific cultural area to be announced in the *Schedule of Classes*.

185 **Latin American Archaeology** (3) Humphrey, Stuart

The culture history of pre-Columbian Mexico and Central America from

the Paleo-Indian period through the Spanish Conquest, emphasizing the origin and development of Latin American high civilizations. (Spring 1975 and alternate springs)

186 **Physical Anthropology of Modern Man** (3) Angel

Individual and social biology, methods and techniques. Genetic, cultural, and ecologic backgrounds of individual and population variation: micro-evolution, growth, paleodemography, paleopathology, forensic identification, techniques. (Spring)

187 **Introduction to Hominid Evolution** (3) Brooks

The fossil record of hominid evolution considered in the light of evolutionary theory. Brief review of the earlier antecedents of man, with concentration on the Pleistocene remains. (Spring 1975 and alternate springs)

188 **Primatology** (3) Brooks

(Formerly Primatology and Primate Social Behavior)

Physical and behavioral characteristics of the various primate groups and their relationship to human physical and cultural evolution. Frequent meetings at the National Zoological Park. (Fall 1975 and alternate falls)

192 **Anthropological Theory** (3) Krulfeld, Brooks

Analysis of the theoretical postulates and assumptions underlying the development of modern cultural anthropology. (Fall and spring)

193 **Anthropological Methods** (3) Krulfeld, Lewis

Approaches to library and field research. Conceptual bases and bias in the delineation of problems; in the selection, analysis, and organization of data; and in the preparation of the final report. Fall 1974 and alternate falls)

195 **Undergraduate Research** (arr.) Staff

Individual research problems. May be repeated for credit. (Fall or spring)

THIRD GROUP

202 **Seminar: Recent Trends in Anthropology** (3) Krulfeld

Major topics of interest in contemporary anthropology since the mid-20th century will be taken up in order, stressing current journal and monograph materials. Fall 1975 and alternate falls)

*215 **Field Methods in Cultural Ecology: Pre-Columbian Settlement Patterns in the Tehuacan Valley** (6) Humphrey, Langran

Field and laboratory examination of settlement patterns and sociopolitical structures in pre-Columbian Mesoamerica and their relationship to agricultural water-control systems.

254 **Seminar: Folklore in America** (6) Golla

Intensive seminar covering the various aspects of American traditional culture, including the theory and methodology of folklore research. Pri-

* Interdepartmental course offered by the departments of Anthropology and Geography and Regional Science.

mary emphasis on Anglo- and Afro-American traditional cultures, with some consideration of other ethnic groups.

261 **Seminar: Anthropological Linguistics** (3) Golla

Anthropological study of language—dialectology, ethnosemantics, descriptive and comparative studies of exotic languages.

262 **Seminar: Applied Anthropology** (3) Lewis, McKay

Use of anthropological methods and techniques in such specific fields as government, community development, land reform, law, and medicine. (Spring)

263 **Seminar: Culture Contact and Change** (3) Simons

Change in Western and non-Western cultures; emphasis on general processes of change and interaction between simpler and more complex societies. (Fall 1974 and alternate falls)

264 **Seminar: Museum Techniques** (3) Humphrey

Principles of anthropological collection, classification, preservation, identification, interpretation, and exhibition of specimens; research and instructional use of the museum. Field trips to area museums. (Fall)

265 **Seminar: Method and Theory in Archaeology** (3) Humphrey, Brooks

Analysis of field techniques, dating methods, and theoretical approaches in reconstructing and interpreting the cultures of the past, utilizing the most recent archaeological techniques. (Spring)

266 **Seminar: Technology** (3) Humphrey, Lewis

Cross-cultural examination of the form, function, meaning, and use of material culture and the behavior patterns involved in its production. (Spring 1975 and alternate springs)

267 **Seminar: Economic Anthropology** (3) Krulfeld

Comparative study of systems of production, distribution, and consumption. (Spring)

268 **Seminar: Peasant Society** (3) Krulfeld

Cross-cultural analysis of peasant societies, including an examination of their manner of functioning within their larger social, economic, and cultural context. (Fall)

269 **Seminar: Structural Problems** (3) Simons

Comparative survey of principles of descent, kinship terminology, and formation of descent groups; problems of variation and change in kinship systems and development of kinship models. (Spring)

*270 **Seminar: Museum Exhibiting** (3) Mahoney

Selected museum exhibiting problems in the social and natural sciences, including methods and techniques of exhibition, problems of museum communication, education, etc. Taught at the Smithsonian Institution. (Fall)

272 **Seminar: Topics in Latin American Anthropology** (3) Staff

Research topic selected from among peasant movements, ethnic groups, land reform, urbanization, archaeological problems. (Spring)

* Joint offering of the Department of Anthropology and the American Studies Program.

273 Seminar: Urban Anthropology (3) McKay
(Formerly Seminar: Culture of Poverty)
Anthropological investigations of city life from Neolithic beginning to the present. Study of occupational, class, and ethnic communities within cities as well as ethnographies of entire cities. Adaptation of traditional field methods to urban settings. (Spring)

274 Seminar: Afro-American Culture (3) McKay
An ethnographic survey of racial, linguistic, and cultural attributes of Americans of African ancestry. African antecedents, conditions of migration, experiences in slave and free communities over their 350-year history in the United States. (Spring 1976 and alternate springs)

282 Seminar: Advanced Archaeology—North American Prehistory (3) Humphrey, Stuart
Analysis in depth of current archaeological problems relating to the origin and development of aboriginal cultures. Specific topic to be announced in the *Schedule of Classes.* (Fall)

283 Seminar: Topics in Old World Anthropology—Physical Anthropology and Archaeology (3) Brooks
(Formerly Seminar: Advanced Archaeology—Old World)
Study of current problems in relation to materials from the old world. Specific area to be announced in the *Schedule of Classes.* (Spring 1976 and alternate springs)

287 Seminar: Problems in Latin American Civilization (3) Staff
Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspects of a selected key theme. Admission by permission of instructor. (Spring)

290 Advanced Museum Research (3) Staff
Supervised individual research and/or field work at the Smithsonian Institution, arranged in consultation with the Smithsonian and the Department of Anthropology. Admission by permission of the Chairman of the Department. May be repeated for credit. (Fall and spring)

291 Seminar: Museology (3) Wright
Twentieth century development of museums—natural history, science, and history; their history, philosophy, and organization; their civic importance and administrative problems. (Spring)

***292 Introduction to Conservation** (3) Rose
Method and theory of conservation, including fine arts, ethnographic archaeological and monuments conservation; handling, restoration, preservation, storage, and display of museum specimens; basic materials of ethnographic objects and the ways they react to their environment. (Fall)

***293 Conservation Laboratory Techniques** (3) Rose
Examination procedures and analytical techniques used in the conservation laboratory, including discussion of chemical composition of solvents, adhesives, coating, and filling materials used in the restoration and stabili-

* Interdepartmental course offered by the departments of Anthropology and Art.

zation of museum specimens. Prerequisite: Anth 292, Chem 13. Taught at the Smithsonian Conservation Laboratory. (Spring)

*294 **Field Research in Historical Archaeology** (3)

Field techniques, including excavation, recording, photography, preservation, laboratory analysis and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md.

295 **Research** (arr.) Staff

May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

Art

Professors D.C. Kline (*Emeritus*), W.A. MacDonald (*Chairman*), L.P. Leite, F.S. Grubar, Roland Fleischer
Professorial Lecturers Grace Evans, John Shapley
Associate Professor D.H. Teller
Adjunct Associate Professor Grose Evans
Assistant Professors H.I. Gates, Lilien Hamilton, W.T. Woodward, Fuller Griffith, J.F. Wright, Jr., J.L. Lake
Assistant Professorial Lecturers Jane Kofler, E.L. Battaglia
Instructor Türker Özdoğan
Lecturer Carolyn Rose
Special Lecturer Lillian Miller

Faculty of the Corcoran School of Art: Roy Slade (*Dean*), Peter Thomas (*Assistant Dean*), Nancy Baer, Barbara Brent, Leon Berkowitz, Joe Cameron, William Christenberry, Terry Dale, Gene Davis, William Dutterer, Mary Beth Edelson, Eugene Frederick, Gary Glover, Tom Green, Samuel Holvey, Andrew Hudson, Paul Kennedy, Blaine Larson, William Lombardo, Ed McGowin, Michael Mitchell, Christopher Muhlert, Robert Newmann, Jack Perlmutter, Fred Pitts, Mark Power, Barbara Price, Kywal Ramkissoon, Paul Reed, Berthold Schumtzhart, Rona Slade, Robert Stackhouse, A. Brockie Stevenson, Joseph Taney, Elliott Thompson, Walter Urie

Bachelor of Arts with a major in Art History (*Departmental*).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Art 31–32 or 71–72.
3. Required courses in related areas—Art 137; Fren 1–2, 3–4, or Germ 1–2, 3–4; Phil 162; or equivalent. (A reading knowledge of French or German should

* Joint offering of the Department of Anthropology and the American Studies Program, in cooperation with St. Mary's College, the Smithsonian Institution, and the St. Mary's (Md.) City Commission.

be acquired as soon as possible. Students who plan to do advanced work in Classical Archaeology or Medieval Art are also advised to study Greek and Latin.)

4. Required courses in the major—Art 101 or 102, 104 or 105, 108, 109, 110, 112, 113 or 114, 117 or 118; 12 additional semester hours in second-group Art History courses.

Art History majors may apply for graduation with Special Honors. In order to be accepted into this program, students must satisfy the general requirements (pages 48–49). They should apply in writing to the Chairman of the Department of Art at the beginning of their senior year. Before admittance to the program, they must pass a reading examination administered by the Department in either French or German. Upon acceptance, candidates will be assigned to one or more faculty advisers under whose direction they will undertake a supervised program of selected reading on which they will be required to submit written, critical reports.

The Department of Art has established a program of study in affiliation with area private art galleries. This program is open to a limited number of qualified undergraduate students. For details, consult the Chairman of the Department of Art.

Bachelor of Arts with a major in Fine Arts (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Art 21–22, 41–42 (students concentrating in photography substitute Art 23–24 for 41–42).

3. Required courses in related areas—Art 31–32 or 71–72; 6 additional semester hours in second-group Art History courses.

4. Required courses in the major—27 semester hours of first- or second-group Fine Arts courses in seven areas—Ceramics, Design, Drawing, Graphics, Painting, Photography, and Sculpture. Students choose one of these areas as a primary area of concentration, in which 12 semester hours are required. The remaining 15 semester hours must be distributed among the other areas, but only in the primary area can work taken amount to 12 semester hours. (Transfer students must take at least 12 semester hours of second-group Fine Arts courses in residence at this University, no matter how much advanced standing in Fine Arts is granted upon admission.)

Fine Arts seniors may apply for graduation with Special Honors. In order to be accepted into this program, the student must satisfy the general requirements (see pages 48–49). They should apply in writing to the Chairman of the Department of Art at the beginning of their senior year. Upon acceptance, each candidate will be assigned one or more faculty advisers under whose direction he will complete a project in his special area of interest. Upon completion of the project, the student will present a one-man exhibit prepared exclusively outside of class, subject to the examination of an Honors Board.

Bachelor of Arts with a major in Classical Archaeology and Anthropology (Departmental).—An interdepartmental major offered by the departments of Art and Anthropology. The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult a departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)

2. Prerequisite course—Anth 1–2.

3. Required courses in the major—Anth 152, 158, 177, 183; Art 101, 102, 103, 111; Hist 109, 110. (A reading knowledge of French and German is recommended.)

Bachelor of Arts with a major in Classical Archaeology and Classics (Departmental).—An interdepartmental major offered by the departments of Art and Classics. The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should

nsult a departmental adviser regarding courses to be taken in satisfying the require-ent for "meaningful initiation" into the Natural and Mathematical Sciences.)

2. Prerequisite courses—Clas 1–2, 3, 4; or Clas 11–12, 13–14.

3. Required courses in the major—Art 101, 102, 103, 111; Hist 109, 110; 14 mester hours of second-group courses in Greek or Latin, including Clas 138. (A ading knowledge of French and German is recommended.)

Master of Arts in the field of Art History.—Prerequisite: a Bachelor of Arts de-ee with a major in Art History from this University, or an equivalent degree. Ap-icants from other institutions must present scores on the Graduate Record Exami-ation to the Office of the Graduate School of Arts and Sciences.

1. *With a concentration in Classical Art and Archaeology, American Art, Renais-nce and Baroque Art,* and *Contemporary Art.*—Required: the general requirements, ages 90–97. As many as possible of the 24 semester hours of course work should e third-group courses. The courses must be completed in 6 semesters or less, with a rade of *A* in at least 6 semester hours of work, and with an overall quality-point ndex of at least 3.25. A reading knowledge examination, preferably in German or rench, must be passed after completing 9 semester hours of course work. A general ritten Master's Comprehensive Examination on the problems in the field of Art istory and a written thesis (equivalent to 6 semester hours) embodying the result f research on some specific topic in the history and theory of art are also required. or details, consult the Chairman of the Department of Art.

2. *With a concentration in Museum Training.*—Required: the general require-ents, pages 90–97. The program of study consists of 36 semester hours of work as ollows: 12 hours of Art History courses (taken before acceptance to degree can-idacy, see below); Art 201–2, 271–72; and 12 additional hours of Art History ourses selected in consultation with the adviser. Grades of *A* are required in at east two courses, and an overall quality-point index of at least 3.25 must be main-ained. A reading knowledge examination, preferable in German or French, must be assed after completion of 9 semester hours of course work. For details, consult he Chairman of the Department of Art.

Acceptance in this degree program as a *degree candidate* is provisional, pending he satisfactory completion of 12 semester hours of graduate Art History courses this requirement will be counted toward the total semester hours required for the egree). Upon completion of these courses the student must make formal applica-ion in writing for *degree candidacy* to the joint George Washington University-National Collection of Fine Arts Committee on Museum Training. The application hould state the reasons and aims for seeking this degree, and the student should ubmit letters of recommendation with the application. A personal interview will also e required.

The Department of Art also has established a program of study in affiliation with he Textile Museum, the Corcoran Gallery of Art, the African Museum, and area private art galleries. Students wishing to earn graduate credit in this program should consult the Chairman of the Department of Art.

Master of Arts in the field of Classical Archaeology, Classics, and History (an nterdepartmental degree program offered by the departments of Art, Classics, and History).—Prerequisite: A Bachelor's degree with a background in Classical Arche-logy and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–97. The program of study con-sists of 24 semester hours of course work (as many as possible should be third-group courses) selected in consultation with the appropriate adviser from the de-partments of Art, Classics, and History; plus a thesis (equivalent to 6 additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

Master of Fine Arts in the field of Ceramics, Design, Graphics, Painting, Photography, or *Sculpture.*—Prerequisite: a Bachelor of Arts degree with a major in Fine Arts in the field of Ceramics, Design, Drawing, Graphics, Painting, Photography, or Sculpture from this University, or an equivalent degree. Students planning to do graduate work in the field of Graphics or Painting must have 12 semester hours of Drawing on the undergraduate level prior to admittance to the Master's degree program.

Required: the general requirements, pages 90–97. In lieu of the foreign language requirement, Master of Fine Arts candidates are required to take 3 additional hours of course work in consultation with the adviser; as many as possible of the remaining 24 hours of course work should be in third-group courses, only 18 hours of which may be in one area, the remaining 6 to be selected from related areas in consultation with the adviser. A creative thesis (equivalent to 6 semester hours) in ceramics, design, graphics, painting, photography, or sculpture, and a paper discussing some technical phase of the problem illustrated by the thesis are also required. A representative portion of the work illustrating the creative thesis may be retained by the University at the discretion of the thesis director in agreement with the second reader. For details, consult the Chairman of the Department of Art.

Bachelor of Arts in Education with a teaching field in Art.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Art option and professional courses listed on pages 108, 117.

ART HISTORY

FIRST GROUP

31–32 **Survey of Western Art** (3–3) Hamilton and Staff

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art. (Art 31 and 32—fall and spring)

71–72 **Introduction to the Arts in America** (3–3) Grubar and Staff

Painting, sculpture, and architecture of America, with selected references to crafts and popular arts. Art 71: from Colonial beginnings to the Republican Age. Art 72: from 19th century to the present. (Art 71 and 72—fall and spring)

SECOND GROUP

101 **Greek and Roman Architecture** (3) MacDonald

(Fall)

102 **Greek and Roman Sculpture** (3) MacDonald

(Spring)

103 **Classical Iconography** (3) MacDonald

Origin and development of myths in classical art.

104 **Renaissance Art in Italy I** (3) Evans, Leite

Early developments from the 13th to the 15th century. (Fall)

105 **Renaissance Art in Italy II** (3) Evans, Leite

High Renaissance and Mannerism. (Spring)

106 **Renaissance Art in the North I** (3) Fleischer

Fifteenth century painting in the Netherlands, Germany, France, and Spain. (Fall)

107 **Renaissance Art in the North II** (3) Fleischer
Sixteenth century painting in the Netherlands, Germany, France, and Spain. (Spring)

108 **18th Century Art in Europe** (3) Fleischer
Development of painting, sculpture, and architecture. (Spring)

109 **19th Century Art in Europe** (3) Leite, Hamilton
Painting and sculpture. (Fall and spring)

110 **Contemporary Art** (3) Leite, Hamilton
Painting and sculpture in 20th century Europe. (Fall and spring)

111 **Classical Archaeology** (3) MacDonald
Archaeological monuments of classical civilizations, with intensive study of one or more areas selected from architecture, sculpture, painting, or minor arts.

112 **Art of Egypt and the Ancient Orient** (3) MacDonald
Study of the art of Mesopotamia, Anatolia, Egypt, and Persia. (Spring)

113 **Baroque Art in Italy** (3) Evans, Leite
Development of painting, sculpture, and architecture in 16th and 17th century Italy. (Spring)

114 **Baroque Art in the North** (3) Fleischer
Development of painting, sculpture, and architecture in the 16th and 17th centuries in Holland, Flanders, Spain, France, Germany, and England. (Fall)

115 **Christian Iconography** (3) Leite
Origins and development of Christian symbols and themes from early Christian to modern times.

117 **Medieval Art I** (3) Evans
Architecture, sculpture, and painting of the early Christian and Byzantine periods. (Fall)

118 **Medieval Art II** (3) Evans
Architecture, sculpture, and painting of the Romanesque and Gothic periods. (Spring)

119 **Pre-Romanesque Art in the North** (3) Evans
The Carolingian and Merovingian periods. (Spring)

120 **Art of China and Japan** (3) Kline
Architecture, painting, and sculpture of China, Korea, and Japan. (Fall)

145 **Folk Arts in America** (3) Kline
Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts. (Fall)

146 **Principles of Museum Work** (3) Staff
Introduction to the history and development of museums; problems of

museum administration, connoisseurship, cataloguing, installation, conservation, and educational service. (Fall)

147 **Pre-Columbian Art** (3) Staff

148 **19th Century American Painting** (3) Grubar, Evans
(Fall)

149 **19th Century American Sculpture** (3) Grubar
(Spring)

155 **Etruscan Art and Archaeology** (6) MacDonald
Offered off campus through the College of General Studies.

THIRD GROUP

201–2 **Museum Projects** (3–3) Staff
Open only to candidates for the degree of Master of Arts in the field of Museum Training. Practical work to be determined by the Committee on Museum Training at the National Collection of Fine Arts. (Academic year)

*203 **Primitive Art** (3) Kline
Arts of prehistoric and primitive man in Europe, the pre-Columbian Americas, Oceania, and Africa. (Spring)

*207 **Modern Architecture** (3) Kline
Development of modern architecture and building technology in Europe and America from the late 19th century to the present. (Fall)

216 **Medieval Painting** (3) Evans
Painting and the decorative arts.

†220 **Seminar: Baroque Art of the 17th Century** (3) Fleischer, Leite
Specific area announced in *Schedule of Classes*. A reading knowledge of Italian is desirable for the Italian area and German for the northern area. (Spring)

†221 **Seminar: Renaissance Art** (3) Fleischer, Leite
Specific area announced in *Schedule of Classes*. A reading knowledge of Italian is desirable for the Italian area and German for the northern area. (Fall)

242 **Etruscan Art and Archaeology** (6) MacDonald
Offered off campus through the College of General Studies.

†243 **Seminar: American Art** (3) Grubar
Specific area announced in *Schedule of Classes*. (Fall and spring)

244 **Seminar: 19th Century European Art** (3) Leite
Specific area announced in *Schedule of Classes*. Reading knowledge of French desirable.

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* May be taken for undergraduate credit with the approval of the instructor.
† May be repeated for credit if the specific area covered is different.

245 **Seminar: 20th Century European Art** (3) Leite

Specific area announced in *Schedule of Classes.*

246 **Seminar: Classical Art** (3) MacDonald

Specific area announced in *Schedule of Classes.*

247 **Seminar: Medieval Art** (3) Evans

Specific area announced in *Schedule of Classes.* (Fall)

248 **Independent Research** (3)

For Master's degree candidates; open to limited number of qualified undergraduates, with permission. Independent research arranged in consultation with individual instructor and graduate adviser. May be repeated for credit. (Fall and spring)

261 **Seminar: Problems in Art History** (3) Staff

Recommended for Art History majors; open to limited number of qualified undergraduates, with permission of instructor. Theory, criticism, or methodology of art history. May be repeated for credit. Topic to be announced in *Schedule of Classes.* (Fall and spring)

271–72 **Museum Techniques** (3–3) Staff

Open only to candidates for the degree of Master of Arts in the field of Art History with a concentration in Museum Training. Intern training in museum work to be determined by the Committee on Museum Training at the National Collection of Fine Arts. (Academic year—4 hours daily, Monday through Friday)

*284 **Seminar: Studies in American Art and History** (3) Miller

Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. (Spring)

289–90 **Thesis Research** (3–3) Staff

(Fall and spring)

†292 **Introduction to Conservation** (3) Rose

Method and theory of conservation, including fine arts, ethnographic archaeological and monuments conservation; handling, restoration, preservation, storage, and display of museum specimens; basic materials of ethnographic objects and the ways they react to their environment. (Fall)

†293 **Conservation Laboratory Techniques** (3) Rose

Examination procedures and analytical techniques used in the conservation laboratory, including discussion of chemical composition of solvents, adhesives, coating, and filling materials used in the restoration and stabilization of museum specimens. Taught at the Smithsonian Conservation Laboratory. Prerequisite: Anth 292, Chem 13. (Spring)

* Joint offering of the Department of Art and the American Studies Program in affiliation with the National Portrait Gallery of the Smithsonian Institution.
† Interdepartmental course offered by the departments of Art and Anthropology.

FINE ARTS

Unless otherwise indicated, Fine Arts courses taught in University studios carry no material or laboratory fees; students must purchase their own materials. Laboratory and material fees for courses taught at the Corcoran School of Art are stated in the course description and are payable at the School.

Courses taught at the Corcoran School of Art have the designation "Corcoran Faculty" for the instructor.

Departmental prerequisite: Art 21–22 and 41–42 (students concentrating in photography substitute Art 23–24 for 41–42) or permission of Department Chairman is prerequisite to all other studio courses in Art.

FIRST GROUP

***21–22 Design I: Basic** (3–3) Staff

Fundamental studies of principles and elements of design. Art 21: study of two-dimensional design. Art 22: three-dimensional studies. (Art 21 and 22—fall and spring)

23–24 Fundamentals of Photography (3–3) Lake, Corcoran Faculty

Fundamental techniques of photography; emphasis on creative expression. Laboratory fee, $25 a semester. (Art 23 and 24—fall and spring)

41–42 Drawing I (3–3) Wright, Corcoran Faculty

Concepts of drawing, traditional and contemporary; training in perception, analysis of form, use of media, and exercises in connoisseurship. Material and model fee when taught on GWU campus, $15 a semester. (Art 41 and 42—fall and spring)

51–52 Ceramics I (3–3) Özdoğan, Corcoran Faculty

Working with clay as an art form. Basic techniques of hand building and wheel throwing. Laboratory fee, $45 a semester. (Academic year)

57–58 Graphics I (3–3) Griffith, Wright

Exploration of the methods of intaglio, relief, printing, and other composite processes. Material fee, $20 a semester. (Academic year)

61–62 Water Color (3–3) Corcoran Faculty

Painting in transparent and opaque water color and in acrylic. Experimentation, figurative and landscape. (Academic year)

65–66 Painting I (3–3) Corcoran Faculty

Emphasis on personal expression with exposure to a variety of styles and attitudes. Use of acrylic and oil. (Academic year)

81–82 Sculpture I (3–3) Gates, Corcoran Faculty

Three-dimensional design. Basic sculptural techniques; modeling, carving, and construction. Media include wood, clay, stone, plaster. Laboratory fee: when taught on GWU campus, $15 a semester; when taught at CSA, $25 a semester. (Academic year)

* Required of all Fine Arts majors.

SECOND GROUP

Second-group Art courses may be repeated for credit with approval of Department.

123–24 **Design II: Individual Problems** (3–3) Staff

Emphasis on the individual student and the problems and materials that specifically interest him in any area of design. (Academic year)

*125–26 **Painting II** (3 or 6–3 or 6) Corcoran Faculty

Emphasis on personal expression; exposure to a variety of styles and attitudes. Materials and techniques subordinate to individual experimentation. Use of acrylic and oil. (Academic year)

*127–28 **Painting III** (3 or 6–3 or 6) Woodward

Exploration of problems in developing a personal visual imagery. Material fee each semester: $12 for 3 semester hours; $24 for 6 semester hours. (Academic year)

*131–32 **Ceramics II** (3 or 6–3 or 6) Özdoğan, Corcoran Ftculty

Development of techniques with emphasis on quality and creativity. Laboratory fee each semester: $45 for 3 semester hours; $60 for 6 semester hours. (Academic year)

135–36 **Advanced Water Color** (3–3) Corcoran Faculty

Development of techniques of water color; concentration on special projects. (Academic year)

137 **Workshop in Materials, Methods, and Techniques** (3) Woodward

Drawings in charcoal, crayon, and pen; painting and preparation of grounds for tempera, encaustic, fresco buono, oil, water color, polymer, and mixed techniques; graphic techniques in woodcut, engraving, etching. Material and model fee, $10. (Fall and spring)

143–44 **Serigraphy** (3–3) Teller

Advanced problems in serigraphy; emphasis on its aesthetic possibilities. Prerequisite: Art 57–58. (Academic year)

*151–52 **Ceramics III** (3 or 6–3 or 6) Özdoğan, Corcoran Faculty

Development of techniques with emphasis on quality and creativity. Students mix own clay and glazes. Laboratory fee each semester: $45 for 3 semester hours; $60 for 6 semester hours. (Academic year)

*153–54 **Graphics II** (3 or 6–3 or 6) Griffith, Wright

Advanced relief, intaglio, and other composite processes. Prerequisite: Art 57–58. Material fee each semester: $20 for 3 semester hours; $40 for 6 semester hours. (Academic year)

*157–58 **Graphics III** (3 or 6–3 or 6) Griffith

Exporation of combined techniques and mixed media. Prerequisite: Art 153–54. Material fee each semester: $20 for 3 semester hours; $40 for 6 semester hours. (Academic year)

159–60 **Drawing II** (3–3) Wright, Corcoran Faculty

Development of drawing. Individual study, application and extensions of

* Fine Arts majors and Masters of Fine Arts candidates should elect 6 semester hours of credit.

drawing. Material fee when taught on GWU campus, $20 a semester. (Academic year)

163–64 **Design: Visual Communication** (3–3) Corcoran Faculty

Layouts and execution in client-presentation form of various graphic design projects—brochures, bookjackets, displays, title graphics for film media, etc. Material fee, $20 a semester. (Academic year)

171 **Calligraphy** (3) Corcoran Faculty

Techniques of hand lettering, traditional and contemporary. Exploration of the decorative potential in lettering. (Fall)

172 **Typography** (3) Corcoran Faculty

Study of type classification, recognition, and adaption. Methods of copy fitting and type reproduction processes. Typographic layout and specification. (Spring)

175–76 **Design Projects** (3–3) Corcoran Faculty

Advanced general design problems in two, three, and four dimensions. Unusual media and techniques; pure concept problems stressed. (Academic year)

177–78 **Survey of Printing and Illustration** (3–3) Corcoran Faculty

Exposure of a maximum range of illustrative processes, both practical and theoretical. Technical aspects of commercial printing processes; methods of preparation of artwork, photographs, and typographic proofs for commercial reproduction. (Academic year)

*179–80 **Sculpture II** (3 or 6–3 or 6) Gates, Corcoran Faculty

Concepts of sculpture; new materials and developments. Laboratory fee each semester when taught on GWU campus; $15 for 3 semester hours; $30 for 6 semester hours. Laboratory fee each semester when taught at CSA: $25 for 3 semester hours; $35 for 6 semester hours. (Academic year)

181–82 **Intermediate Photography** (3–3) Lake

Basic problems. Introduction to color photography with emphasis on creative expression. Prerequisite: Art 23–24 or permission of instructor. Laboratory fee, $25 a semester. (Academic year)

185–86 **Painting and Drawing** (3–3) Corcoran Faculty

Techniques of drawing and painting in oil, acrylic, and water color. Work from life model and still life. (Academic year)

*189–90 **Sculpture III** (3 or 6–3 or 6) Gates

Advanced study concentrating on relevance of scale and media. Relationship of sculpture to the environment. Laboratory fee for each semester: $15 for 3 semester hours; $30 for 6 semester hours. (Academic year)

193 **Film Making** (3) Corcoran Faculty

Basic techniques and procedures in film making. The student will create his own short film. (Fall and spring)

* Fine Arts majors and Masters of Fine Arts candidates should elect 6 semester hours of credit.

*195 **Documentary Photography** (3) — Lake and Staff

Social problems, team-taught. Each student will work on projects with social dimensions. Laboratory fee, $25. Admission by permission of instructor. Limited enrollment. (Spring)

THIRD GROUP

All third-group Art courses may be repeated for credit with the approval of the Department.

205 **Advanced Photography** (3) — Lake, Corcoran Faculty

Advanced problems in photography; emphasis on individual development. Prerequisite: Art 181–82 or permission of instructor. Laboratory fee, $25. (Fall and spring)

206 **Photography: Special Projects** (3) — Lake

Laboratory fee, $25.

208 **Advanced Photography** (3) — Corcoran Faculty

Advanced problems in photography; emphasis on individual development. Prerequisite: Art 181–82 or permission of instructor. Laboratory fee, $25. (Fall and spring)

†231–32 **Design III** (3 or 6–3 or 6) — Gates

New media and techniques in three-dimensional design. Laboratory fee, $15 a semester for 3 semester hours; $30 a semester for 6 semester hours. (Academic year)

†234 **Design IV** (3 or 6) — Staff

Presentation, model building, and specifications of materials in three-dimensional problems. (Fall and spring)

†235 **Design V** (3 or 6) — Teller

Designing and executing textiles using the techniques of silk screen, block print, and batik. (Fall and spring)

249 **Theory of Design** (3) — Teller

Application of design principles to painting, architecture, sculpture, and minor arts of today. Relationship of design principles to the contemporary artists and his work. Open to undergraduate students with permission of instructor. (Fall)

†251–52 **Ceramics IV** (3 or 6–3 or 6) — Özdoğan, Corcoran Faculty

Development of techniques with emphasis on quality and creativity. Students mix own clay and glazes. Laboratory fee each semester: $45 for 3 semester hours; $60 for 6 semester hours. (Academic year)

†253 **Ceramics V** (3 or 6) — Özdoğan, Corcoran Faculty

Laboratory fee: $45 for 3 semester hours; $60 for 6 semester hours. (Fall and spring)

†255–56 **Graphics IV: Serigraphy** (3 or 6–3 or 6) — Teller

Prerequisite: Art 157–58. (Academic year)

* Interdepartmental course offered by the departments of Art and Journalism.
† Fine Arts majors and Master of Fine Arts candidates should elect 6 semester hours of credit.

*257–58 **Graphics V: Etching and Engraving** (3 or 6–3 or 6) Griffith
Prerequisite: Art 157–58. Material fee each semester: $20 for 3 semester hours; $40 for 6 semester hours. (Academic year)

*259 **Graphics VI: Lithography** (3 or 6) Wright
(Fall and spring)

*260 **Graphics VII: Relief Printing** (3 or 6) Griffith
Material fee: $20 for 3 semester hours; $40 for 6 semester hours. (Fall and spring)

*265–66 **Painting IV** (3 or 6–3 or 6) Woodward
Creative painting; students work on independent projects as well as assigned problems. Material and model fee each semester: $12 for 3 semester hours; $24 for 6 semester hours. (Academic year)

267–68 **Individual Problems in Photography** (3–3) Lake and Staff
Instruction and professional guidance relevant to individual projects. Laboratory fee, $25 a semester. (Academic year)

*275 **Painting V** (3 or 6) Woodward
(Fall or spring)

277–78 **Design: Advanced Visual Communication** (6–6) Corcoran Faculty
Design and execution of graphic design projects, including magazine spreads, posters, advertisements, trademarks, letterheads, packages. Psychological and symbolic aspects of design solutions. Laboratory fee, $30 each semester. (Academic year)

*279–80 **Sculpture IV** (3 or 6–3 or 6) Gates
Laboratory fee each semester: $15 for 3 semester hours; $30 for 6 semester hours. (Academic year)

*281 **Sculpture V** (3 or 6) Gates
Laboratory fee: $15 for 3 semester hours; $30 for 6 semester hours. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Art Therapy—Graduate Study

Professor B.I. Levy (*Program Director*)
Adjunct Assistant Professors Hanna Kwiatkowska, Elinor Ulman (*Coordinator of Training*)
Assistant Professorial Lecturers Edith Kramer, Mildred Lachman
Clinical Instructors Georgette Powell, J.B. Ramsay, Christine Wang, Sandra Butterly

Master of Arts in the field of Art Therapy.—Prerequisite: a Bachelor's degree, evidence of significant training and/or experience in the arts, including painting, drawing, and clay modeling; course work in the behavioral and/or social sciences, including personality theory, abnormal psychology, and child psychology.

* Fine Arts majors and Master of Fine Arts candidates should elect 6 semester hours of credit.

Required: the general requirements, pages 90-97. Prospective candidates should consult the brochure which describes the program for specific requirements.

Fields of Emphasis: Adult Art Therapy, Family Art Therapy, Child Art Therapy, and Research.

THIRD GROUP

201 **Introduction to Art Therapy** (3) Ulman

Lectures, presentation of illustrative case material, class discussion of assigned readings. Survey covering range of art therapy practice, diagnostic and treatment approaches, historical development, main theoretical trends. (Fall)

202 **Case Studies in Art Therapy** (3) Ulman

Discussion of case material provided by students in order to refine methods of working, improve written and oral reports. Instructor and other practitioners may provide supplementary illustrative material. Assigned reading. (Spring)

203 **Technique of Art Therapy** (3) Kwiatkowska

Art therapy approaches with individuals and groups of different diagnostic categories in various settings presented through illustrative clinical examples. Students experiment with numerous techniques through the use of art materials. (Fall)

205–6 **Family Art Therapy** (3–3) Kwiatkowska

Principles of family art therapy as adjunctive and primary treatment; art techniques for evaluation of family dynamics. Students participate in working with families. (Academic year)

207–8 **Art as Therapy with Children** (3–3) Kramer

Lectures, presentation of case material, studio work, class discussion of assigned reading. Special considerations of work in art therapy with children will be explored from the theoretical and practical standpoints. (Academic year)

211 **Survey of Art Therapy** (3) Lachman

Illustrated lectures, reading, discussion, studio work. Use of visual arts in the service of personal development: history, theories, range of practice. For students not intending to specialize in Art Therapy. Open to advanced undergraduates with permission of instructor. (Fall and spring)

275 **Group Art Therapy** (3) Kwiatkowska, Ulman

Development of skills and increased awareness as a participant in an art therapy group. Limited to selected Master's degree candidates. Prerequisite: a minimum of 6 semester hours of graduate course work in Art Therapy and permission of instructor. (Fall and spring)

283–84 **Practicum in Art Therapy** (3–3) Staff

Field experience. On-the-job supervision supplemented by supervision from the art therapy staff. Prerequisite: A Th 201, 203, and consultation with adviser prior to registration.

285 **Special Projects in Art Therapy** (3) Staff

Individual work based on study, research, or practice. Details to be

worked out with each student. Resource people may be called upon to assist, as appropriate. May be repeated for credit with approval of adviser.

Astronomy

See "Physics."

Biochemistry

Professors C.R. Treadwell (*Chairman*), B.W. Smith, G.V. Vahouny, J.M. Bailey, Helen Hess
Professorial Lecturers W.W. Burr, Jr. (*Isotopes*), Edward Steers, Jr., W.F. Anderson (*Genetics*), Gordon Guroff, A.N. Schechter, Steven Levisohn
Associate Professor G.A. Walker
Assistant Professor Linda Gallo (*Research*)
Lecturer P.H. Fishman
Special Lecturer J.C. Smith, Jr.

Master of Science in the field of Biochemistry.—Prerequisite: a Bachelor's degree. The undergraduate program must have included the following courses, or equivalent: B Sc 11–12; Chem 11–12, 22, 151–52, 153–54; Phys 1, 2.

Required: the general requirements, pages 90–97, including Bioc 221–22, 227, 299–300. The remaining courses are to be selected from Bioc 224, 232, 241, 262, 295; or, with the approval of the adviser, from graduate courses in Chemistry, Microbiology, Physiology, or Pharmacology. It is usually not possible to arrange courses and research so that the student can be assured of completing all of the required work in one academic year.

Master of Science in the field of Mycology.—An interdepartmental degree offered by the departments of Biochemistry, Epidemiology and Environmental Health, and Microbiology. See the Department of Epidemiology and Environmental Health, which administers the program, for details.

Doctor of Philosophy in the field of Biochemistry.—Required: the general requirements, pages 90–94, 97–99.

Research fields: Amino Acid Metabolism; Animal Nutrition; Biochemical Evolution; Biochemistry of Cancer; Biochemistry of Tissue Culture; Carbohydrate Metabolism; Chemistry and Metabolism of Carbohydrates, Lipids, Proteins; Complex Lipids; Endocrinology; Intermediary Metabolism; Lipids; Metabolic Relationships of Insulin; Metabolism; Metabolism of Connective Tissue; Metabolism of Purines and Pyrimidines; Neurochemistry; Nutrition; Protein Biosynthesis; Protein Metabolism; Tissue Respiration; and Vitamins.

221–22 **General Biochemistry** (2 or 4–4 or 5) Vahouny, Gallo, and Staff

Lecture and laboratory. A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Graduate students *must* register for both lecture and laboratory: Bioc 221, 4 semester hours; Bioc 222, 5 semester hours. With specific recommendation by the undergraduate adviser and the Department, undergraduate students may register for the lecture portion only: Bioc 221, 2 semester hours; Bioc 222, 4 semester hours. Prerequisite: Chem 152, 154. Material fee (graduate students only), $20 a semester. (Academic year)

224 **Biochemistry of Enzymes** (1)

Biochemistry of enzymes and enzyme reactions. Prerequisite: Bioc 221. (Fall)

225 **Biochemistry Procedures** (3) B. Smith and Staff

Laboratory course. Material fee, $16. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

227 **Biochemistry Seminar** (1) Staff

Current literature in biochemistry. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

232 **Proteins and Amino Acids I** (1) Steers

Prerequisite: Bioc 221. (Fall)

233 **Proteins and Amino Acids II** (1) Steers, Schechter

Continuation of Bioc 232. Methods for the study of protein confirmation; determination of active sites of enzymes; mechanisms of reactions at the active site. (Spring)

241 **Isotopes** (3) Burr

Theoretical characterization of isotopes and their application in biology and medicine. Attention given to counting, health physics and radiation safety, autoradiography, chromatography. Laboratory fee, $16. (Spring)

251 **Carbohydrate Metabolism** (1) Staff

Prerequisite: Bioc 222. (Spring 1976 and alternate springs)

252 **Biochemistry of the Brain** (1) Malone*

For medical students; open to limited number of graduate students. Recent biochemical developments in structure, functions, and metabolic processes unique to the brain. (Spring)

254 **Human Nutrition** (1)

For medical students; open to limited number of graduate students. Application of nutritional principles in humans. (Spring)

256 **Biochemistry of Organ Function** (1) N. Kramer†

For medical students; open to limited number of graduate students. Emphasis on biochemical processes unique to particular organ systems; application of these processes to evaluation of function. (Spring)

258 **Inherited Metabolic Diseases** (1) Levisohn

For medical students; open to limited number of graduate students. Contribution of molecular biology to understanding of human mutations and hereditary diseases. Specific disease states and genetics of protein structure discussed. Prerequisite: Bioc 221. (Spring)

260 **Biochemistry of the Steroids** (1) O. Dodek‡

For medical students; open to limited number of graduate students. Basic chemistry of the steroids, pathways of biosynthesis and metabolism,

* Dr. Malone is Professor of Neurology and of Child Health and Development in the School of Medicine and Health Sciences.
† Dr. Kramer is Associate Professor of Medicine in the School of Medicine and Health Sciences.
‡ Dr. Dodek is Assistant Clinical Professor of Obstetrics and Gynecology in the School of Medicine and Health Sciences.

regulatory mechanisms, physiologic effects, clinical measurements of endogenous steroids, clinical manifestations of steroid imbalance, steroid changes in pregnancy, and steroid therapy. (Spring)

Vahouny

262 **Biochemistry of the Lipids** (1)
Discussion of topics of current interest, including digestion, energy production, biosynthesis, function in specialized tissues, and subcellular particles. Content differs each time course is offered; may be repeated for credit. (Spring)

Anderson

266 **Biochemical Genetics** (1)
For medical students; open to limited number of graduate students. (Spring)

Walker

268 **Biochemistry of Bone and Muscle** (1)
Study of structure, chemistry, and biochemistry as they relate to the normal and diseased states of bone and muscle; emphasis on current theories and techniques. (Spring)

Staff

295 **Research in Biochemistry** (arr.)
Participation in a project under investigation in the Department or one in a related field suggested by the student and approved by the Staff. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

Staff

299–300 **Thesis Research** (3–3)
(Fall and spring)

Staff

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

Staff

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Biological Sciences

Professors A.H. Desmond (*Chairman*), R.L. Weintraub, Kittie Parker
Adjunct Professors T.E. Bowman, M.L. Jones, L.S. Kornicker, H.A. Rehder, F.A. Chace, Jr., Raymond Manning
Professorial Lecturers K.C. Kates, R.S. Sigafoos, W.A. Shropshire, Jr.
Associate Professors S.O. Schiff, D.L. Atkins
Adjunct Associate Professors W.D. Hope, D.L. Pawson, Joseph Rosewater, C.F. Roper, C.G. McWright, Mary Rice
Assistant Professors W.G. Nash, Henry Merchant, R.K. Packer, T.L. Hufford, R.E. Knowlton, C.S. Henry, Sandra Smith-Gill
Assistant Professorial Lecturers P.E. Spiegler, Jessie Dickens, Barbara Timberlake
Lecturers Dee Ann Houston, Thomas May

Bachelor of Arts or Bachelor of Science with a major in Biology, Botany, or Zoology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Humanities.)
2. Prerequisite courses—B Sc 11–12, or equivalent.
3. Required courses in related areas—Chem 11–12; Chem 151–52 and 153–54, or 50. (The following courses are strongly recommended: Math 31; Phys 1, 2; two years of French, German, or Russian; Stat 91.)
4. (a) Required courses for the major in Biology—a minimum of 24 semester hours of second-group courses, which should include at least 6 hours in Biology, 6 in Botany, and 6 in Zoology.

(b) Required courses for the major in Botany—a minimum of 24 semester hours of second-group courses in Botany or a combination of Botany and Biology.

(c) Required courses for the major in Zoology—a minimum of 24 semester hours of second-group courses in Zoology or Biology.

Master of Science in the field of Biology, Botany, or Zoology.—Prerequisite: a Bachelor's degree with a major in one of the following from this University, or an equivalent degree: (1) *Biology field*—an undergraduate major in Biology, Botany, or Zoology; (2) *Botany field*—an undergraduate major in Botany or Biology; (3) *Zoology field*—an undergraduate major in Zoology or Biology. The undergraduate program must have included the following courses, or equivalent: Chem 151–52 and 153–54, or 50; Math 31; Phys 1, 2.

Required: the general requirements, pages 90–97. The minimum requirement consists of 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours). With the permission of the Department a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis.

Doctor of Philosophy in the field of Biology, Botany, or Zoology.—Required: the general requirements, pages 90–94, 97–99. The program of study is determined in consultation with the graduate committee of the Department. Each candidate is required to pass the General Examination in four areas which support the field of study selected. The required courses and tool subject options vary with the field of study undertaken.

Research fields in Biology: Cell Physiology, Cytogenetics, Cytology, Developmental Genetics, and Molecular Genetics.

Research fields in Botany: Photobiology, Phycology; Plant Ecology, Plant Physiology (Microorganisms), Plant Physiology (Vascular Plants), and Taxonomy.

Research fields in Zoology: Animal Ecology; Bioenergetics; Comparative Neuroanatomy; Comparative Physiology; Herpetology; Histophysiology; Invertebrate Zoology; Marine Biology; Radiation Biology; Taxonomy, Anatomy, and Physiology of Mollusks; Vertebrate Anatomy and Taxonomy; Vertebrate Embryology and Morphogenesis; Vertebrate Ichthyology; and Vertebrate Physiology.

Bachelor of Arts in Education with a teaching field in Biology.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Biology option and the professional courses listed on pages 108, 117.

Departmental prerequisite: B Sc 11–12 or equivalent is prerequisite to all second-group courses in Biology, Botany, and Zoology, except by permission of the instructor.

BIOLOGY

FIRST GROUP

3–4 **Introductory Biology for Nonscience Majors** (3–3) Schiff

Lecture (2 hours), laboratory (2 hours). Survey of biological principles; emphasis on man as a functional organism in his environment. Prerequisite to B Sc 4: B Sc 3. Material fee, $12 a semester. (Academic year)

11–12 **Introductory Biology for Science Majors** (4–4) Merchant

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Prerequisite to B Sc 12: B Sc 11. Material fee, $15 a semester. (Academic year)

*26 **Environmental Issues** (3) Langran, Schiff

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Fall and spring)

SECOND GROUP

108 **Organic Evolution** (3) Henry

Synthetic theory of organic evolution including treatment of speciation, adaptive radiation, biogeography, population biology, sociality, and human evolution. (Fall and spring)

111 **Introductory Microbiology** (4) Weintraub

Lecture (2 hours), laboratory (4 hours). Survey of the major groups of microorganisms with emphasis on structure, physiology, ecology, phylogenetic relationships, and economic importance. Prerequisite: one year of chemistry. Material fee, $18. (Fall)

115 **Cytology** (4) Schiff

Lecture (2 hours), laboratory (4 hours). Structure and function of cells; analysis of chromosomes; cytological techniques and preparation of slides. Recommended: one year of chemistry.

118 **Advanced Cytology** (3) Schiff

Lecture (1 hour), laboratory (4 hours). Mechanisms of cell action. Laboratory consists of a project to be selected by the student with concurrence of the instructor. Prerequisite: B Sc 115. Material fee, $18.

122 **Molecular and Subcellular Biology** (3) Weintraub

Structure and function of biological molecules, viruses, and cellular organelles. Prerequisite: one semester of organic chemistry. (Fall)

123 **Cell Biochemistry** (3) Weintraub

Introduction to the metabolism of generalized cells of animals, plants, and microorganisms, including energetics, enzymes, respiration, biosyntheses, and regulatory mechanisms. Prerequisite: one semester of organic chemistry. (Spring 1976 and alternate springs)

* Offered jointly by the Division of Experimental Programs and the departments of Biological Sciences and Geography and Regional Science.

124 Cell Biochemistry Laboratory (1) Weintraub

Designed to illustrate some of the principles and techniques of biochemical experimentation. Prerequisite or concurrent registration: B Sc 123. Material fee, $20. (Spring 1976 and alternate springs)

127 Genetics (4) Nash

Lecture (3 hours), laboratory (2 hours). Introductory course. Basic aspects of transmission of genetic traits with particular reference to the chemical basis of heredity and gene action. Material fee, $18. (Fall and spring)

129 Cell Physiology (3) Weintraub

Study of cell processes, including growth, division, differentiation, interactions, aging, movements, energy perception and transduction, luminescence. (Spring 1975 and alternate springs)

130 Cell Physiology Laboratory (1) Weintraub

Exercises to illustrate some principles and techniques. Prerequisite or concurrent registration: B Sc 129. Material fee, $20. (Spring 1975 and alternate springs)

138 Advanced Genetics (3) Nash

Emphasis on the use of genetic analysis in solving modern biological problems. Prerequisite: introductory course in genetics. (Spring)

167 Radiation Biology (3) Schiff

Chemical, physical, and biological aspects of radiation; effects of radiation on cells and organisms, with emphasis on mammals; genetic effects. Recommended: two years of biological sciences, and chemistry or physics. (Fall)

171 Undergraduate Research (arr.) Staff

Admission by permission of the staff member concerned. May be repeated for credit. Prerequisite: Chem 50 or 152; 16 semester hours in Biological Science courses. Material fee, $18. (Fall and spring)

172 Independent Study in Cell and Molecular Biology (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

173 Independent Study in Developmental Biology (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

174 Independent Study in Organismic Biology (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

175 Independent Study in Genetic and Evolutionary Biology (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

176 Independent Study in Environmental Biology (2) Staff

Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

177 **Laboratory Techniques, Instrumentation, and Data Analysis** (3) Staff

Theory and practice in experimental design; techniques and instrumentation used in biological research laboratories.

181–82 **Senior Seminar** (1–1) Staff

Lectures and discussions on current biological problems. (Academic year)

THIRD GROUP

206 **Seminar: Radiation Biology** (3) Schiff

Actions of radiation at subcellular, cellular, and organismal levels; factors modifying radiation damage; practical considerations in radiation exposure. Prerequisite: B Sc 167 or equivalent. (Spring)

207 **Seminar: Origin of Life** (3) Weintraub

Review of experiments and speculations concerning origin of life and molecular aspects of biological evolution. (Spring 1975 and alternate springs)

220 **Seminar: Cell Physiology** (3) Shropshire

Review in depth of selected topics. May be repeated for credit. (Fall)

222 **Seminar: Topics in Molecular Biology** (3) Weintraub

(Spring 1975 and alternate springs)

227 **Seminar: Genetics** (3) Nash

Current problems in genetics. Students are required to present one seminar covering the full class period. May be repeated for credit. (Fall)

230 **Understanding Environmental Issues—Water Pollution** (6) Hufford and Staff

Methods and techniques used in determining water quality; engineering and technological skills currently utilized or available for use in dealing with a variety of water quality aspects; attitudes and approaches of the social scientists; practical aspects of implementing water-quality programs. Preparation of secondary school curricula.

248 **Analysis of Development** (3) Smith-Gill

Lectures and reports on experimental morphology, developmental genetics, biochemical development, and developmental endocrinology. (Spring)

249 **Seminar: Developmental Biology** (3) Smith-Gill

Discussion and reports on current literature in the field of developmental biology. (Spring)

255 **Seminar: Consortium Biology** (2)

Topic to be announced in *Schedule of Classes.* (Spring)

295 **Research** (arr.) Staff

Investigation of special problems. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

OURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

BOTANY

ECOND GROUP

105 **Local Flora** (4) Parker

Lecture (2 hours), laboratory and field (4 hours). Field and laboratory studies on local flora; emphasis on the woody plants. Material fee, $15. (Fall)

106 **Field Botany—Lower Plants** (4) Parker

Lecture (2 hours), laboratory and field (4 hours). Primarily for nonspecialists, emphasizing algae, mosses, and ferns. Material fee, $15. (Spring)

109 **Developmental Plant Anatomy** (4) Hufford

(Formerly Structure of Seed Plants)

Demonstration, observation, discussion (6 hours). Initiation and ontogeny of tissues and organs of vascular plants. Material fee, $15. (Spring)

110 **Comparative Plant Morphology** (4) Hufford

(Formerly Lower Plants)

Demonstration, observation, discussion (6 hours). Evolutionary morphology and life histories as a basis for a phylogenetic study and the critical roles plants have in human welfare. Material fee, $15. (Fall)

125 **Flowering Plants** (4) Parker

Lecture (2 hours), laboratory and field (4 hours). Origin, evolutionary development, and principles of systematics of flowering plants. Material fee, $15. (Spring)

132 **Mycology** (4) Staff

Lecture (2 hours), laboratory (3 hours). Material fee, $15. (Fall)

133 **Plants, Man, and Life** (3) Parker

Plants by which man lives and upon which he depends for his food, shelter, medicine, clothing, and industries, as well as his drugs and drinks. (Spring)

134 **Plant Pathology** (4) Staff

Lecture (2 hours), laboratory (3 hours). Material fee, $15.

135 **Plant Physiology** (4) Weintraub

Lecture (2 hours), laboratory (4 hours). Physiology of seed plants with emphasis on growth, development, tropisms, and reproduction. Prerequisite: Chem 11–12. Recommended: Chem 50 or 151–52. Material fee, $20. (Spring 1975 and alternate springs)

137 **Horticulture** (3) — Parker
Lecture (2 hours), laboratory (2 hours). Basic principles of growth, propagation, and care of ornamental plants. Material fee, $10. (Fall)

141 **Plant Ecology** (4) — Sigafoos
Lecture (2 hours), laboratory (4 hours). Material fee, $15. (Fall 1974 and alternate falls)

THIRD GROUP

221 **Seminar: Systematics** (3) — Parker
Review of current work in various disciplines of systematic research; topics of special interest to participants. (Fall 1975 and alternate falls)

235 **Seminar: Plant Physiology** (3) — Staff

242 **Seminar: Plant Ecology** (3) — Sigafoos
(Spring 1976 and alternate springs)

299–300 **Thesis Research** (3–3) — Staff
(Fall and spring)

ZOOLOGY

SECOND GROUP

101 **Invertebrate Zoology** (4) — Knowlton
Lecture (2 hours), laboratory (4 hours). General survey of invertebrate animals, including classification, morphology, physiology, embryology, and evolutionary relationships among phyla. Material fee, $18. (Fall)

102 **Advanced Invertebrate Zoology** (4) — Knowlton
Lecture (2 hours), laboratory and field (4 hours). Study of invertebrate systems (cells, tissues, organs, organisms), with emphasis on functional aspects (physiology and ecology) and taxonomy of important groups. Prerequisite: B Sc 101 or equivalent. Material fee, $18. (Spring)

104 **Comparative Vertebrate Anatomy** (4) — Atkins
Lecture (2 hours), laboratory (4 hours). Evolution and comparative morphology of vertebrates, stressing recent forms. Material fee, $18. (Fall and spring)

140 **General Ecology** (4) — Merchant
Lecture (3 hours), laboratory and field (3 hours). Introduction to the concepts of limiting factors, biogeochemical cycles, trophic levels, and energy transfer, and their relationship to the structure and function of populations, species, communities, and ecosystems. Material fee, $18. (Fall)

143 **Animal Ecology** (4) — Merchant
Lecture (3 hours), laboratory and field (3 hours). Application of ecological principles to the understanding and manipulation of animal populations. Prerequisite: B Sc 140 or permission of instructor. Laboratory fee, $18. (Spring)

144 **Aquatic Ecology** (4) Merchant

Lecture (3 hours), laboratory and field (3 hours). Principles applied to aquatic systems with special references to physicochemical properties, typical habitats and communities. Prerequisite: B Sc 143 or permission of instructor. Laboratory fee, $18. (Spring)

145 **Introduction to Vertebrate Embryology** (4) Smith-Gill

Lecture (2 hours), laboratory (4 hours). Origin and early development of the individual, formation of organ systems. Emphasis on frog, chick, and pig, with reference to human embryo. Material fee, $18. (Fall and spring)

146 **Experimental Developmental Biology** (4) Smith-Gill

Lecture (2 hours), laboratory (4 hours). Introduction to the experimental, biochemical, and genetic analysis of developing systems through examination of literature and laboratory experiments. Recommended: a course in vertebrate embryology, a course in cell biology or genetics, and Chem 151–52 or 50. Laboratory fee, $20. (Spring)

148 **Histology** (4) Desmond

Lecture (2 hours), laboratory (4 hours). Introduction to microscopical anatomy of normal tissues and organs with emphasis on the interrelationship of structure and function. Material fee, $18. (Fall and spring)

152 **Protozoa** (4) Staff

Lecture (2 hours), laboratory (4 hours). Introduction to protozoa; classification, life histories, genetics, and physiology; emphasis on free-living types. Material fee, $18. (Spring 1976 and alternate springs)

153 **Survey of Neurobiology** (4) Atkins

Lecture (2 hours), laboratory (4 hours). Study of the gross and cellular anatomy, physiology, and biochemistry of the nervous system; emphasis on mammals. Prerequisite: B Sc 104. Material fee, $20.

154 **Vertebrate Zoology** (4) Atkins

Lecture and discussion (2 hours), laboratory and field (4 hours). Vertebrate natural history and systematics, emphasizing higher and transitional taxa. Prerequisite: B Sc 104. Material fee, $18. (Spring)

155 **Parasitology** (4) Kates

Lecture (2 hours), laboratory (4 hours). Introduction to animal parasitology; survey of parasitic types from protozoa through arthropods. Material fee, $18. (Fall 1976 and alternate falls)

157 **Comparative Endocrinology** (3) Desmond

Comparative study of basic principles of chemical integration, neuroendocrine relationships, and mechanisms of hormone action. (Spring)

161 **Entomology** (4) Henry

Lecture (2 hours), laboratory (4 hours). The biology of insects, including their morphology, physiology, development, behavior, and ecology. Material fee, $18. (Fall)

Henry

162 **Insect Evolution** (4)
(Formerly Insect Physiology)
Lecture (2 hours), laboratory (4 hours). Adaptive radiation of insects; emphasis on insect-plant relationships, behavior, and paleontology. Prerequisite: B Sc 161. Material fee, $18. (Spring)

Packer

163 **Human Physiology** (3)
Introduction to the function of organ systems of the human body. (Fall)

Packer

164 **Human Physiology Laboratory** (1)
Study of basic physiology laboratory techniques; emphasis on the experimental study of homeostatic mechanisms in humans. Prerequisite or concurrent registration: B Sc 163. Material fee, $20. (Fall)

Packer

165 **Vertebrate Physiology** (4)
Lecture (3 hours), laboratory (3 hours). Detailed study of selected organ systems, stressing chemical and physical bases. Prerequisite: B Sc 163 and 164, or equivalent. Prérequisite or concurrent registration: Chem 151–52 or 50. Material fee, $20. (Spring)

THIRD GROUP

Knowlton

204 **Seminar: Invertebrate Zoology** (3)
Study of original publications on hormones of invertebrate animals. (Fall)

Zook

*205 **Comparative Pathology** (3)
An introduction to the study of disease and disease mechanisms in vertebrates, and comparison with disease in man. Recommended: courses in anatomy, histology, and physiology. (Fall)

Desmond

244 **Histophysiology** (3)
Study of current publications in the field of histophysiology.

Desmond

245 **Histochemistry** (3)
Theory and application of chemical techniques in determining changes in the amount and distribution of inorganic and organic constituents of tissues during different physiological and pathological conditions.

Atkins

252 **Seminar: Neurobiology** (3)
Study of current publications in the field of neurobiology. (Spring 1975 and alternate springs)

Packer

265 **Comparative Animal Physiology** (3)
Survey of the physiological basis of adaptation of animals to diverse environments, emphasis on nonmammalian vertebrates. Prerequisite: B Sc 164 or equivalent. (Fall)

Staff

299–300 **Thesis Research** (3–3)
(Fall and spring)

* An interdepartmental course offered by the departments of Biological Sciences and Pathology.

Biology

See "Biological Sciences."

Botany

See "Biological Sciences."

Business Administration

Professors J.L. Jessup, J.C. Dockeray, R.B. Eastin, Edwin Timbers, H.R. Page, Frederick Amling, Guy Black (*Chairman*), P.D. Grub, R.C. Sedwick
Professorial Lecturers L.C. Collins, R.A. Kaye, K.F. McClure, J.P. Murphy, J.F. Doubleday, W.G. Torpey, Ben Burdetsky
Associate Professors E.R. Magruder, Rodney Eldridge, R.A. Barrett, G.P. Lauter, S.F. Divita, J.R. Roman, Jr., S.N. Sherman, Norma Loeser, J.H.H. Carrington, C.R. Miller
Associate Professorial Lecturers W.G. Wells, Jr., R.W. Hagauer, P.L. Foster, Bruce Benefield, T.C. Stanton, M.J. Johnson, Martin Wender, J.R. Potter, Jr.
Assistant Professors J.W. Waldrip, R.F. Dyer
Assistant Professorial Lecturers G.J. Glassman, N.R. Harbaugh, L.R. Brown, J.G. Birdsong, Stanley Tesko

Programs of study in Business Administration leading to the degrees of *Bachelor of Business Administration*, *Master of Business Administration*, and *Doctor of Business Administration* are offered by the School of Government and Business Administration (see pages 130–59).

FIRST GROUP

51 Introduction to Business (3) Page

Structure, activities, and problems of business enterprise; its contribution to the individual and to society; careers in business. (Fall and spring)

61 Personal Finance (3)

Management of personal and family income and expenses; consumer spending, budgeting, home buying, credit buying, borrowing, banking, saving and investing, insurance and estate planning, taxation. (Fall)

SECOND GROUP

101 The Business Environment (3) Timbers

Economic and legal environment of business enterprise; social and political influences; contemporary problems and issues. (Fall and spring)

102 Fundamentals of Management (3) Carrington

Planning, organizing, directing, coordinating, and controlling activities of the administrative unit; evolution of management thinking. (Fall and spring)

104 Small Business Management (3) Carrington

Essentials of operating a small business; required records and reports, resolution of day-to-day problems, sources of assistance to small businesses. Offered primarily as a service to the business community; open to degree candidates with the approval of the instructor. (Spring)

105 Personnel Management (3) Barrett, Loeser

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities. (Fall and spring)

106 Problems in Personnel Management (3) Loeser

Principles and problems of personnel management and industrial relations illustrated by cases drawn from industry and government. Prerequisite: B Ad 105. (Fall)

107 Collective Bargaining (3) Barrett

American unionism and collective bargaining; economic, social, and public policy considerations. The negotiation and administration of collective bargaining agreements. Prerequisite: B Ad 105 or permission of instructor. (Spring)

113 Real Estate (3) Doubleday

Principles of urban real estate practice; leasing and property management, valuation, appraisal, financing, taxation, urban growth, urban renewal. (Fall)

121 Fundamentals of Insurance and Risk Management (3) Doubleday, Wells

Function of insurance and risk management in business enterprise. (Fall)

122 Insurance Estate Planning (3) Doubleday, Wells

Insurance and estate programming in providing protection and estate development; disposition of the individual estate. (Spring)

131 Business Finance (3) Amling, J. Roman

Analyzing capital requirements and methods of acquiring funds; planning efficient use of capital. Asset management, financial analysis, sources of funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51. (Fall and spring)

132 International Business Finance (3) Eldridge

Principles, practices, problems, and institutions of international finance. Emphasis on international financial markets, exchange rates, balance-of-payments restraints, and governmental policies. Prerequisite: B Ad 131. (Fall)

133 Capital Formation (3) Eldridge

The process of capital formation in a free enterprise economy. Roles of business firms, financial intermediaries, money and capital market institutions, governmental regulatory agencies, fiscal and monetary policies. Prerequisite: B Ad 131. (Spring)

138 Investment and Portfolio Management (3) Amling

Theory and principles of security analysis and portfolio management.

including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2, B Ad 131. (Fall and spring)

141 **Basic Marketing Management** (3) Divita, Waldrip, Dyer

Marketing and marketing management, consumer and demand analysis, retailing, wholesaling. Emphasis on major decision areas and tools. Prerequisite: Econ 1–2. (Fall and spring)

143 **Marketing Research** (3) Lauter, Dyer

Principles and practices of marketing research; emphasis on basic methods and techniques, sources and interpretation of data, and presentation of results. Prerequisite: B Ad 141. (Spring)

144 **International Marketing Management** (3) Lauter, Waldrip

Analysis of the international marketing position of the United States, channels for international marketing, international advertising media, legal aspects, foreign market surveys, development of policies. (Fall)

145 **Sales Management** (3) Waldrip

Organization of sales department, sales planning and forecasting, quotas, territories, performance standards, and analysis and control of distribution costs. Prerequisite: B Ad 141. (Fall)

147 **Advertising** (3) Dyer

Advertising as a function of marketing and merchandising; uses and limitations, evaluation, criticism, and control of advertising. (Spring)

158 **Physical Distribution Management** (3) Potter

Distribution from shipper's point of view: problems of plant location, inventory control, warehousing; traffic management emphasized, including private carriage. Prerequisite: Econ 1–2. (Fall)

161 **Commercial Law** (3) Collins, McClure, Murphy

Fundamental concepts and principles of law encountered in business activity; contracts, bailments, agency, sales, negotiable instruments, bankruptcy, other topics. Basic legal considerations in business decision-making. (Fall and spring)

171 **Principles of Transportation** (3) J. Roman

Impact of intercity transportation systems on society. Emphasis on modal differences in development, economic characteristics, and regulation. Prerequisite: Econ 1–2. (Fall)

172 **Public Utilities** (3) Staff

Legal and economic meaning of public utility concept; development, services, economic characteristics, rate-making, and regulation with emphasis on electric, gas, and telephone industries. Prerequisite: Econ 1–2. (Spring)

173 **Transportation Systems Management** (3) J. Roman

Comparative study, from the standpoint of various carrier modes, of management problems common to all modes of domestic and international transportation. Prerequisite: B Ad 171, Econ 1–2. (Spring)

174 **Urban Transportation** (3) J. Roman

Problems of developing balanced transportation systems for urban areas—

area needs, modal evaluation, cost effectiveness, finance, and marketing. Prerequisite: B Ad 171, Econ 1–2; or equivalent. (Fall)

175 **Introduction to International Business** (3) Kaye, Waldrip
(Formerly Introduction to Foreign Trade)
Physical movement of goods in international business; conditions essential for successful trading; export shipment, documentation, procedural problems. Emphasis on ocean marine insurance and export traffic management policy. Prerequisite: Econ 1–2. (Fall and spring)

176 **International Business Theory and Policy** (3) Eldridge
Theoretical relationships underlying international business transactions, role of government, international agreements between private producers, trade with developing nations, policy. Prerequisite: Econ 1–2. (Fall and spring)

178 **International Business Policy and Operations** (3) Waldrip
Analysis of overseas projects according to purpose and type of organization; development and management of overseas operations in different world areas. Prerequisite: B Ad 175 or permission of instructor. (Spring)

181 **Manufacturing Production** (3) Staff
Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from various process and fabrication industries. Prerequisite: Math 51, 52; Stat 51 or equivalent. (Fall and spring)

192 **Internship in Business Administration** (arr.) Carrington
Internship assignment with an extramural sponsor: a business firm, a business-related government agency, or an interest group. Open to selected juniors and seniors by permission of adviser.

198 **Business Policy and Administration** (3) Eastin
Terminal undergraduate course in Business Administration. Integration of functional activities in arriving at over-all business policy decisions. Prerequisite: B Ad 102, 105, 131, 141, 181.

199 **Individual Research** (3)
Assigned topics. Admission by prior permission of adviser. May be repeated once for credit. (Fall and spring)

THIRD GROUP

201 **Social Environment of Business** (3) Timbers, Divita
Contemporary social forces acting on business management; business responsibility, ethics. (Fall)

202 **Relations of Government to Business** (3) Timbers
Regulatory and promotional activities of the government, independent regulatory agencies, antitrust activities, monetary and fiscal policy, regulation of labor-management relations. (Fall)

203 **Legal Environment of Business** (3) Timbers
Business under the U.S. Constitution, federal legislation, legal precedents, and agency orders. Major emphasis on court decisions relating to business. Prerequisite: B Ad 202 or permission of instructor. (Spring)

208 **Personnel Management and Industrial Relations** (3) — Barrett, Magruder

Survey of personnel management practices and procedures, including labor-management relations. (Fall)

209 **Seminar: Personnel Management** (3) — Eastin

Industrial personnel and manpower management, research in advanced problems. (Spring)

210 **The Personnel Manager** (3) — Jessup

The personnel manager and his place in the organization, relation to other executives, policy role and relations with chief executive. Problems of the senior personnel executive. Prerequisite: B Ad 208 or permission of instructor.

211 **Leadership and Executive Development** (3) — Grub, Loeser

Theories of managerial leadership; issues and problems associated with leadership in large organizations and at higher management levels; executive selection and development. Prerequisite: Mgt 201 or permission of instructor. (Fall and spring)

212 **Unionism and Collective Bargaining** (3) — Barrett, Burdetsky

The American labor movement. Collective bargaining and the conduct of labor relations under collective bargaining agreements. (Fall)

213 **Current Issues in Unionism, Collective Bargaining, and Labor Relations** (3) — Barrett, Burdetsky

Current problems and issues. Prerequisite: B Ad 212. (Spring)

225 **Seminar: Manufacturing Production** (3)

Production technology, including new processes, materials, products, equipment, and facilities. Implications of emerging technology in managing the production function. Prerequisite: B Ad 181 or permission of instructor. (Spring)

231 **Financial Decision-making** (3) — Amling, Dockeray

Functions and objectives of financial management, asset management, problems of internal financial analysis, rate-of-return analysis, financial forecasting, problems of capital demand and supply. Prerequisite: Acct 115 or equivalent, B Ad 131. (Fall and spring)

232 **Capital Resource Management** (3) — Amling, Dockeray

Problems of capital acquisition, costs, rationing, structure; dividend policy. Prerequisite: B Ad 231. (Fall)

233 **International Business Finance** (3) — Eldridge

Analysis of problems in international business finance. Impact of the evolving international payments system on business. Prerequisite: B Ad 131 or equivalent. (Spring)

234 **Seminar: Capital Formation** (3) — Eldridge

Determinants of saving and investment, timing of corporate security issues, analysis of current capital market conditions. Prerequisite: B Ad 131 or equivalent. (Fall)

235 Financial Management (3) — Amling

Problems of financial management; planning financial structure, obtaining and managing capital, issuing and placing securities, administering income, security arrangements. Prerequisite: Acct 215, Mgt 201. (As arranged)

237 Investment Analysis (3) — Amling

Risk-reward analysis of security investments including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: B Ad 131. (Fall and spring)

238 Seminar: Investment and Portfolio Management (3) — Amling

Portfolio management theory, application, and computer modeling. Independent research on investment analysis and portfolio management with emphasis on theory, cases, and computer applications. Prerequisite: B Ad 237.

241 Marketing Management (3) — Lauter, Divita

Marketing management problems; market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs. (Fall and spring)

243 Seminar: Marketing Research (3) — Dyer

Research as an aid to decision-making and increased efficiency in marketing, marketing research process, critical appraisal of methods and results, applications. (Spring)

246 Consumer Behavior (3) — Dyer

Consumer decision-making in the market place; research in pertinent interdisciplinary studies in psychology, sociology, and other behavioral fields; present and potential applications for marketing. (Fall)

247 Current Issues in Marketing (3) — Divita, Dyer

Primarily for doctoral students. Theoretical and practical issues in the development of a comprehensive and interrelated body of knowledge in marketing. Impact of current political, economic, and social trends. (Fall)

248 International Marketing (3) — Lauter

Organization for international marketing, demand analysis, product development and policies, marketing structure and trade channels, advertising and promotion problems and policies, pricing, and legal aspects. Effective international marketing strategy. (Fall and spring)

249 Marketing Policy (3) — Divita

Analysis of complex marketing problems involving policy and operational decisions; emphasis on creative marketing strategy. (Spring)

250 Marketing to the Government (3) — Divita

Overview of government R&D and systems markets. Government acquisition process, buyer behavior, market research, technological planning and the bid decision, field sales force management, proposals, market strategy, pricing strategy, product-line strategy. (Fall)

253 **Distribution Logistics** (3) Potter

Problems of physical distribution and supply of goods. Role of logistics in the economy and the business firm, transportation rates and services, location theory and problems, service standards, inventory control, information flow, scheduling, allocation, warehousing, traffic, and logistics system organization. (Spring)

255 **International Business in Perspective** (3) Grub, Eldridge

The nature and order of magnitude of international business; global patterns of trade and investment; international and national institutions; policy issues, trends. (Fall and spring)

256 **Seminar: International Trade** (3) Grub, Eldridge

Classical and modern concepts of international trade theory, instruments and institutions of trade policy, barriers to trade, preferential treatment and trading blocs, trends and issues. (Fall and spring)

257 **Operation of the Multinational Firm** (3) Grub

International market entry and expansion; operating policies, procedures, and problems of multinational companies; developing executives for international business. Prerequisite: advanced Master's degree standing. (Fall and spring)

258 **Colloquium on International Business** (3) Grub

Primarily for doctoral students. Selected problems in international business with emphasis upon regionalism, trade barriers, investment incentives, international organization, foreign aid and development assistance and its relation to trade with developing nations, and trade with the Communist Bloc. Admission by prior permission of instructor. (Fall)

259 **Comparative Business Management** (3) Lauter

Primarily for doctoral students. Comparative analysis of business practices and management in different countries and economic systems. Generic characteristics of management and of business enterprises and how these are modified in different environments. Influence on the level of economic development, social structure, history, and culture of a country. Prerequisite: Mgt 201 or equivalent. (Spring)

260 **Economics for Management** (3) Staff

Economic theory and its application in managerial decision-making; price theory, income and employment theory, related topics. Review of economic methodology.

261 **Managerial Microeconomics** (3) Black, Holland

Applications of economic theory and statistics to business decisions involving demand, production, cost, profits, investments, and inventories. Prerequisite: Econ 217, Mgt 203, Stat 111 and 112; or equivalent; or permission of instructor. (Fall and spring)

262 **Managerial Macroeconomics** (3) Black, Holland

Use of economic theory and statistics in business forecasting; interpretation of economic trends and developments; analysis of governmental economic policies. Prerequisite: Econ 218, Mgt 203, Stat 111 and 112; or equivalent; or permission of instructor. (Fall and spring)

264 **Economics of Production** (3) Black

Economics of production and manufacturing. Applications to managerial decision-making with respect to production, investment, procurement, research and development, and cost-benefit analysis. Prerequisite: Econ 217, Stat 111, college algebra or Mgt 203. (Fall)

265 **Seminar: Managerial Economics** (3) Black

Primarily for doctoral students. Special topics and applications of analytical tools to business decision-making and policy. Prerequisite: B Ad 261, 262; or permission of instructor.

275 **Seminar: Transportation** (3) J. Roman

Problems and special areas of interest in transportation. Prerequisite: B Ad 171 or permission of instructor. (Spring)

279 **Purchasing and Materials** (3) Page, Sherman

Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics.

280 **Procurement and Contracting** (3) Sherman, Benefield

Overview of procurement and contracting; emphasis on federal government buying policies, practices, and procedures.

282 **Government Contract Administration** (3) Sherman

Surveillance and management of contract performance. Measurement of progress; specification interpretation; quality assurance; changes, negotiation, and adjustment; financial considerations; property; terminations; regulatory and policy concerns. Prerequisite: B Ad 280 or permission of instructor.

283 **Pricing and Negotiation** (3) Sherman, Wender

Scope and objectives of negotiated procurement; preparation, conduct, and recording of negotiations; analysis of cost, price, profit, investment, and risk; cost principles; incentives; relationship of contract type to work requirements; techniques of negotiation. Prerequisite: B Ad 280 or permission of instructor.

284 **Procurement Data Management** (3) Sherman

Technical data and the procurement process; contract-controlling documentation, patent rights, rights in data, requirements determination and the acquisition of data, federal policies, contractor interests. Configuration management; control of changes. Prerequisite: B Ad 280 or permission of instructor.

285 **Systems Procurement and Project Management** (3) D. Roman, Tesko

Development and procurement of major systems. Project management and its impact on the procurement process. Procurement planning. Prerequisite: B Ad 280 or permission of instructor.

291 **Seminar: Business Management** (3) Eastin

Primarily for doctoral students. Research on various phases of management as practiced in American industry. (Fall and spring)

293 **Business Research** (3) Dyer

Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings. (Fall and spring)

295 **Business Decision Simulation** (3) Staff

Managerial decision-making in a diversified firm in a simulated competitive environment in which a complex situation is played out using computers. Prerequisite: advanced Master's or doctoral degree standing.

297 **Business Policy Formulation** (3) Jessup, Page, Grub

Analysis of operational situations and policy issues. Developing and implementing solutions to managerial problems. Prerequisite: advanced Master's degree standing. (Fall and spring)

298 **Readings in Business** (3) Staff

Supervised readings in selected fields within business administration. Admission by prior permission of instructor. May be repeated once for credit. (Fall and spring)

299 **Thesis Seminar** (3) Staff

Examination of thesis standards, research philosophy and methodology. (Fall and spring)

300 **Thesis Research** (3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Business Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Business Administration candidates. May be repeated for credit. (Fall and spring)

RELATED COURSES IN LAW

With the permission of the Chairman of the Department of Business Administration and the Dean of the National Law Center, students may elect the following courses offered by the National Law Center. For detailed description, consult the *National Law Center* catalogue.

355 *Government Contracts* (3)

427 *Legal Aspects of International Business Transactions* (2)

431 *Government Procurement Law* (3)

433 *Performance of Government Contracts* (3)

434 *Government Contract Claims and Litigation* (2)

541 *Seminar: European Common Market* (2)

542 *Seminar: International Technical and Economic Assistance* (2)

Chemistry

Professors C.R. Naeser, R.C. Vincent, R.E. Wood, T.P. Perros, W.E. Schmidt, D.G. White, J.B. Levy, Nicolae Filipescu
Associate Professors Bette Barton, A.D. Britt (*Chairman*), E.A. Caress, D.A. Rowley
Assistant Professor Michael King

Bachelor of Arts or *Bachelor of Science with a major in Chemistry* (*Departmental*).—The Department offers two undergraduate majors designed to give students broad training in the basic divisions of chemistry; analytical, inorganic, organic, and physical. *Major I* provides considerable concentration in chemistry. However, it permits a wider selection of electives and thus should meet the needs of students preparing to enter medicine, dentistry, or related fields. *Major II* is intended primarily for students preparing for graduate study in chemistry or those planning to enter the chemical profession and wishing to be certified to the American Chemical Society as having met the minimum requirements for professional training. Two foreign languages are recommended for students planning to do graduate work in chemistry.

The following requirements must be fulfilled:

1. Students in either Major I or Major II must meet the general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation into the Humanities and Social Studies.)

2. Prerequisite courses for Major I and Major II—Chem 11–12 and 22, or 15–16; Math 30, 31; Phys 1, 2.

3. (a) Required courses for Major I—B Sc 11–12 or Geol 21–22 (required of Bachelor of Science degree candidates only); Chem 111–12, 113–14, 122, 134, 141, 151–52, 153–54.

(b) Required courses for Major II—B Sc 11–12 or Geol 21–22 (required of Bachelor of Science degree candidates only); Chem 111–12, 113–14, 122, 141–42, 151–52, 153–54, 235; Math 32; one course selected from Chem 195, 207, 213, 221, 222, 251, Math 111, 139, Phys 161, 165, 175, Stat 197.

Twelve semester hours in French, German, Greek, Hebrew, Italian, Latin, Russian, or Spanish (students in Major II should elect German) are recommended for students in both Major I and Major II.

For graduation with Special Honors in Chemistry, application must be made at the beginning of the senior year. Registration in Chem 195 is required at that time.

Master of Science in the field of Chemistry.—Prerequisite: a Bachelor's degree with a major in Chemistry from this University, or an equivalent degree.

Required: the general requirements pages 90–97. The required 30 semester hours of graduate work must include Chem 213 and 221, and at least two of the following: Chem 207, 236, and 251. The thesis requirement, Chem 299–300, may be in analytical, inorganic, organic, or physical chemistry. Chem 156, or its equivalent, is prerequisite to research work in the field of organic chemistry. All graduate students are required to participate in the seminar and colloquium programs. A reading knowledge examination in French, German, or Russian (German or Russian preferred) must be passed prior to beginning the third semester of graduate work or before the second half of the work is started, whichever occurs first. A student who intends to become a doctoral candidate is strongly urged to take Chem 207 as early as possible in his graduate program.

Master of Science in the field of Geochemistry (an interdepartmental degree offered by the departments of Chemistry and Geology).—Prerequisite: a Bachelor's degree with a major in Chemistry or in Geology from this University, or an equivalent degree.

Required: the general requirements, pages 90–97, including Chem 111–12; Geol 141, 241, 249; Chem 213 or Geol 246; and Chem 299–300. The Master's Comprehensive Examination must be taken before registration for the second half of the thesis work. A reading knowledge examination in a foreign language, approved by the Department of Chemistry or Geology, must be passed prior to beginning the third semester of graduate work or before beginning the thesis work, whichever occurs first.

Doctor of Philosophy in the field of Chemistry.—Required: the general requirements, pages 90–94, 97–99. Chem 207, 213, 221, 235, 251, and 350 are normally required of the doctoral student, in addition to other courses as determined by consultation with the Departmental program committee. The tool requirement options are (1) a foreign language reading examination in German and either French or Russian or (2) a foreign language reading examination in German and a demonstrated proficiency in computer programming. The latter option is required for students in physical or theoretical chemistry. Cumulative examinations replace the "General Examination" requirement.

Research fields: Analytical Chemistry, Inorganic Chemistry, Organic Chemistry, Physical Chemistry (Electrochemistry, Kinetics, Magnetic Resonance, Theoretical), Physical Organic Chemistry (Reaction Mechanisms), and Structure and Synthesis of Natural Products.

Doctor of Philosophy field of study in Geochemistry (an interdepartmental field offered by the departments of Chemistry and Geology.)—Required: the general requirements, pages 90–94, 97–99, including a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 117 and 118, or 91; and the satisfactory completion of the General Examinations in four fields, including chemistry and geochemistry.

Bachelor of Arts in Education with a teaching field in Chemistry.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Chemistry option and professional courses on pages 109, 117.

Graduate Placement Examinations: All entering students in the Master's and Doctoral programs in the field of Chemistry are required to take the American Chemical Society Graduate Level Placement Examinations, given by the Department of Chemistry, prior to registration in the Graduate School of Arts and Sciences. The four placement examinations (in the disciplines of analytical, organic, inorganic, and physical chemistry) are of the multiple-choice type. These tests are designed to cover the subject matter in the disciplines generally taught in modern undergraduate programs preparatory for graduate work in chemistry, and the results are used by the Department to advise the individual student in planning a program of courses appropriate to his background.

Registration: Before completing registration each student must obtain from the representative of the Department an assignment to lecture, recitation, and laboratory sections. The work of the junior and senior years must be approved by the Department.

PHYSICAL SCIENCE

FIRST GROUP

3–4 **Contemporary Science (3–3)** Filipescu

(Formerly Fundamentals of Physical Science)

For nonscience majors. Lecture (2 hours), laboratory (3 hours). Contemporary topics from the physical sciences are integrated to introduce the nonscience major to the basic methods and achievements of physical science. Laboratory fee, $15 a semester. (Academic year)

CHEMISTRY

FIRST GROUP

11–12 General Chemistry (4–4) Staff

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $21 a semester. (Chem 11 and 12—fall and spring)

13 General Chemistry (4) Brill

For engineering and applied science students only. Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Atomic structure, chemical bonding; chemical equations; acids and bases; chemical equilibrium; liquid and solid states; periodicity; electrochemistry; organic chemistry. Prerequisite: Math 31, Phys 2. Laboratory fee, $21. (Fall)

15–16 Intensive General and Analytical Chemistry (Honors Course) (4–4) Rowley

Chem 15: lecture (3 hours), laboratory (3 hours), recitation (1 hour). Chem 16: lecture (2 hours), laboratory (6 hours), recitation (1 hour). Equivalent to Chem 11–12 and 22, but with selected topics studied in depth. Prerequisite to Chem 15: high school physics and chemistry. Prerequisite to Chem 16: Chem 15. Admission by placement test prior to registration or on basis of College Board Advanced Placement Examination. Laboratory fee, $21 a semester. (Academic year)

22 Introductory Quantitative Analysis (4) Vincent

Lecture (2 hours), laboratory (6 hours). Theory and practice of quantitative analysis by classical methods; introduction to instrumental analysis. Prerequisite: Chem 12. Laboratory fee, $21. (Fall and spring)

50 Introduction to Organic Chemistry (4) Cares

Lecture (3 hours), laboratory (3 hours). A terminal course for students in related disciplines. This course does not fulfill the organic chemistry requirement for chemistry majors or premedical students. Prerequisite: Chem 12 or 16. Laboratory fee, $21. (Spring)

SECOND GROUP

110 Introduction to Physical Chemistry (3) Wood

Topics include chemical thermodynamics, chemical kinetics, electrochemistry, solution chemistry, membrane and phase equilibria, and others. Prerequisite: Chem 16 or 22, Math 31, Phys 2; or permission of instructor. Not open to chemistry majors. May not be taken for credit by students who have received credit for Chem 111–12 or an equivalent course.

111–12 Physical Chemistry (3–3) Wood

Gas laws, chemical thermodynamics, solution chemistry, chemical equilibrium, kinetics, chemical statistics, electrochemistry, and other topics. Prerequisite to Chem 111: Chem 16 or 22; Math 31; Phys 2. Prerequisite to Chem 112: Chem 111. (Academic year)

113–14 **Physicochemical Measurements** (2–2) Wood, Barton, Schmidt

Laboratory complement to Chem 111–12 and 122. Prerequisite or concurrent registration for Chem 113: Chem 111. Prerequisite or concurrent registration for Chem 114: Chem 112, 113, and 122. Laboratory fee, $21 a semester. (Academic year)

122 **Instrumental Analysis Lectures** (2) Schmidt

Theory of instrumental methods in qualitative and quantitative analysis, determination of structure, and study of reaction mechanisms with emphasis on electroanalysis, spectrophotometry, and chromatography. Correlated with Chem 114. Prerequisite or concurrent registration: Chem 112. (Spring)

134 **Descriptive Inorganic Chemistry** (2) Rowley

Intermediate-level course emphasizing the descriptive chemistry of the elements. Prerequisite: Chem 16 or 22, 152. Prerequisite or concurrent registration: Chem 111. (Fall)

141–42 **Advanced Experimental Chemistry** (2–2) White, Caress

Designed to provide the chemistry major with facility in experimental methods common to all disciplines of chemistry. Prerequisite: Chem 154. Prerequisite or concurrent registration: Chem 111. Laboratory fee, $21 a semester. (Academic year)

151–52 **Organic Chemistry** (3–3) Staff

Chemistry of the compounds of carbon. Prerequisite to Chem 151: Chem 12 or 16. Prerequisite to Chem 152: Chem 151. (Academic year)

153–54 **Organic Chemistry Laboratory** (1–1) Staff

Laboratory complement of Chem 151–52. Prerequisite or concurrent registration: Chem 151–52. Prerequisite to Chem 154: Chem 153. Laboratory fee, $21 a semester. (Academic year)

156 **Qualitative Organic Analysis** (3) Caress

Lecture (1 hour), laboratory (6 hours). Identification of pure organic compounds, separation of mixtures, and identification of their components. Required of all students planning research work in organic chemistry. Prerequisite: Chem 16 or 22, 154. Laboratory fee, $21. (Spring)

191 **History of Chemistry** (2) Perros

Historical development of chemistry from antiquity to the 20th century. Prerequisite: Chem 12 or 16. (Fall 1975 and alternate falls)

195 **Undergraduate Research** (1 or 2) Staff

Research on problems approved by the Staff. May be repeated once for credit. Laboratory fee, $10.50 a semester hour. (Fall and spring)

THIRD GROUP

207 **Chemical Bonding** (3) Barton

Introduction to quantum chemistry. Molecular orbital theory, atomic and molecular structure spectroscopy. Prerequisite: Chem 112. (Fall)

211–12 **Physical Chemistry** (2–1) Wood

Same as Chem 111–12. Admission only by departmental permission.

Credit assigned upon satisfactory completion of Chem 213. (Academic year)

Wood

213 **Chemical Thermodynamics** (3)

Application of thermodynamics to chemical problems. Thermochemistry, homogeneous and heterogeneous equilibria, statistical calculation of thermodynamic properties, electrochemistry. Prerequisite: Chem 112 or 212. (Spring)

Barton

216 **Statistical Mechanics as Applied to Chemistry** (3)

Introduction to classical and quantum statistics designed to acquaint the student with basic principles and application of method. Prerequisite or concurrent registration: Chem 207 or permission of instructor. (Spring 1976 and alternate springs)

Barton

217 **Theory of Magnetic Resonance** (3)

Application of quantum theory and the techniques of magnetic resonance to chemical problems; emphasis on the connection between theory and experiment. Molecular motion, relaxation theory, bonding, etc. Prerequisite: Chem 207 or permission of instructor. (Spring 1975 and alternate springs)

Filipescu

219 **Spectrochemistry** (3)

Energetic states of molecules under the influence of electromagnetic radiation and their relation to structures and spectroscopic properties. Prerequisite: Chem 207 and 221, or permission of instructor. (Spring 1975 and alternate springs)

Britt

221 **Advanced Analytical Chemistry I** (3)

Theory and application of recent spectrometric methods of analysis, including electrical, magnetic, and optical instrumentation. Prerequisite Chem 122. (Fall)

Schmidt

222 **Advanced Analytical Chemistry II** (2 or 3)

Lecture (2 hours), laboratory (3 hours—optional). Theory and application of electroanalysis and separations by physiochemical methods. Prerequisite: Chem 122. Laboratory fee, $10.50. (Spring 1976 and alternate springs)

White

233 **Organometallic Chemistry** (3)

Survey of organometallic compounds with emphasis on the compounds of lithium, boron, aluminum, silicon, the transition metals, and the catalytic role of certain organotransition metal complexes. Prerequisite: Chem 236 and 251, or permission of instructor. (Spring 1976 and alternate springs)

White

235–36 **Advanced Inorganic Chemistry** (3–3)

Application of modern chemical theories to inorganic substances and reactions followed by a detailed study, developed from the periodic table, of the chemistry of the more common elements. Prerequisite to Chem 235: Chem 112, 152. Prerequisite to Chem 236: Chem 235. (Academic year)

Rowle

237 **Physical-Inorganic Chemistry** (3)

Quantitative application of modern theories for interpretation and explanation of the electronic properties of transition-metal complexes. Pr

requisite: Chem 112 and 134, or Chem 235. (Fall 1975 and alternate falls)

238 **Topics in Transition Metal and Inner-transition Metal Chemistry** (3) Perros

A systematic study of the significant and distinctive properties of the transition and inner-transition elements in relation to their positions in the periodic table. Prerequisite: Chem 236. (Fall 1974 and alternate falls)

251–52 **Advanced Organic Chemistry** (3–3) Filipescu

Synthesis, reactions, and properties of organic compounds; fundamental theories of organic chemistry, emphasis on reaction mechanisms. Prerequisite to Chem 251: Chem 112, 152. Prerequisite to Chem 252: Chem 251. (Academic year)

257 **Physical-Organic Chemistry** (3) Levy

The transition state theory of chemical kinetics, applications to reaction mechanisms; kinetic isotope effects, linear-free energy relationships, concentrated and "super" acids, Woodward-Hoffman rules, free radical reactions. Prerequisite: Chem 252 or permission of instructor. (Fall 1975 and alternate falls)

258 **Synthesis and Structure Determination in Organic Chemistry** (3) Caress

Methods of structure determination and synthesis of complex organic molecules. Prerequisite: Chem 251 or permission of instructor. (Fall 1974 and alternate falls)

295 **Research** (arr.) Staff

Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit not to exceed a total of 8 semester hours. Laboratory fee, $10.50 a semester hour. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

Laboratory fee, $21 a semester. (Fall and spring)

FOURTH GROUP

350 **Choice and Design of a Research Problem** (1) Staff

Development in written form of an original research plan, fully referenced, and its oral defense. (Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy cumulative examinations. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Chinese

See "East Asian Languages and Literatures."

Classics

Associate Professor J.E. Ziolkowski (*Chairman*)
Associate Professorial Lecturers A.B. Seidman, Mary Norton
Assistant Professor Mary Xiroyanni
Assistant Professorial Lecturers D.B. Beers, Zvi Porath, Livia Straus

Bachelor of Arts with a major in Classical Humanities (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Clas 1–2, 3, 4; or equivalent; or Clas 11–12, 13–14; or equivalent; or Clas 15–16, 17–18; or equivalent; or Clas 21–22, 23–24; or equivalent; and Clas 64, 71, 72.
3. Required courses in the major—(a) 12 semester hours selected from second-group Classics courses; (b) 18 semester hours selected from Art 101, 102, 103, 111; Hist 105, 108, 109, 110, 111; Phil 111; P Sc 117; Rel 9, 10.

Bachelor of Arts with a major in Latin (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Clas 1–2, 3, 4; or equivalent.
3. Required courses in related areas—Art 111; Hist 109, 110; and either Hist 105 or Phil 111. (A reading knowledge of French and German is recommended.)
4. Required courses in the major—22 semester hours in second-group Latin courses, including Clas 131–32, 138.

Bachelor of Arts with a major in Classical Archaeology and Classics (Departmental).—An interdepartmental major arranged in conjunction with the Department of Art. The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Natural and Mathematical Sciences.)
2. Prerequisite courses—Clas 1–2, 3, 4; or Clas 11–12, 13–14.
3. Required courses in the major—Art 101, 102, 103, 111; Hist 109, 110; 14 semester hours in second-group courses in Greek or Latin, including Class 138. (A reading knowledge of French and German is recommended.)

Master of Arts in the field of Classical Archaeology, Classics, and History (an interdepartmental degree program offered by the departments of Art, Classics, and History).—Prerequisite: a Bachelor's degree with a background in Classical Archaeology and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–97. The program of study consists of 24 semester hours of course work (as many as possible should be third-group courses) selected in consultation with the appropriate adviser from the department of Art, Classics, and History; plus a thesis (equivalent to 6 additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

LATIN AND GREEK

FIRST GROUP

Ziolkowski

1–2 Beginning Latin (3–3)

Grammatical essentials of the language, appropriate reading selections

development of English derivatives, introduction to Roman life and literature. (Academic year)

3 **The Life and Times of Ovid** (3) Ziolkowski

Selections from Ovid's mythological and love poetry—in Latin; discussion of the culture of the Augustan Age. Prerequisite: Clas 1–2 or equivalent. (Fall)

4 **Vergil's Aeneid** (3) Staff

Significant passages of Vergil's famous epic—in Latin; reading and discussion of the entire poem in translation. Prerequisite: Clas 3 or permission of instructor. (Spring)

11–12 **Beginning Greek: Classical** (3–3) Xiroyanni

(Formerly Beginning Greek)

Study of the grammar, vocabulary, and structure of Greek. Reading of selected classical authors. (Academic year 1975-76 and alternate years)

13–14 **Intermediate Greek: Classical** (3–3) Xiroyanni

(Formerly Clas 13 The Last Days of Socrates and Clas 14 Readings in Greek Literature)

Review of grammar; extensive reading of prose and poetry: e.g., Homer, Herodotus, or a play. (Academic year 1974-75 and alternate years)

15–16 **Beginning Greek: Modern** (3–3) Xiroyanni

Study of Modern Greek with conversation, composition, and reading of selected passages from contemporary Greek authors. (Academic year 1974-75 and alternate years)

17–18 **Intermediate Greek: Modern** (3–3) Xiroyanni

Review of grammar, conversation; extensive reading. (Academic year 1975-76 and alternate years)

SECOND GROUP

109–10 **Major Latin Authors** (3–3) Norton

Selections from one or two major authors will be read each semester. May be repeated for credit. Prerequisite: Clas 3–4 or permission of instructor. (Academic year)

131–32 **Latin Prose Composition** (1–1) Staff

Exercises in Latin prose composition for Latin majors. Other students may enroll by permission of instructor.

134 **Medieval Latin** (3) Andrews

Selections from the Vulgate and representative Latin writers through the 11th century. Prerequisite: Clas 3, 4; or permission of instructor. May be taken for graduate credit with approval of instructor. (Spring)

139–40 **Major Greek Authors** (3–3) Ziolkowski

Selections from a wide variety of Greek prose, drama, and poetry, suited to the needs of the class. May be repeated for credit with permission of instructor. Prerequisite: Clas 14. (Academic year)

141–42 **Greek Prose Composition** (1–1) Staff
Exercise in Greek prose composition. Prerequisite: Clas 12 and permission of instructor. (Academic year)

185–86 **Directed Reading** (1, 2, or 3) Staff
Reading of material in the student's field of interest. Admission by permission of instructor.

COURSES IN ENGLISH TRANSLATION

FIRST GROUP

64 **Greek and Latin Origins of English Words** (3) Staff
Study of Greek and Latin roots in English to improve vocabulary and facilitate understanding of the language of science, philosophy, politics, etc. Survey of the historical contact between Latin and English.

71 **Survey of Greek Literature** (3) Xiroyanni
Survey of important works in Greek literature from Homer to Lucian. Study of Greek literature in its historical context, emphasis on various literary genres. Students who receive credit for Clas 105 cannot receive credit for Clas 71. (Fall)

72 **Survey of Latin Literature** (3) Staff
Survey of Latin literature from the third century B.C. to the Renaissance. Extensive readings from Plautus, Catullus, Cicero, Horace, Vergil, Tacitus, and Petronius; selections from Medieval and Neo-Latin authors. (Spring)

SECOND GROUP

105 **Survey of Classical Humanities** (3) Norton
Representative masterpieces of Greek and Roman literature: epic, lyric, dramatic, philosophical, and historical. Students who receive credit for Clas 71 cannot receive credit for Clas 105.

108 **Classical Mythology** (3) Norton
Mythology of the Greeks and Romans from the creation of the world, tales of the gods, heroes, and great families that have influenced literature, art, and music. (Fall)

113 **Greek and Roman Drama** (3) Staff
Selected masterpieces of Greek and Roman tragedy and comedy. (Spring)

127 **Classical Influence on Western Civilization** (3) Ziolkowski
A survey of Greek and Roman influence on Western civilization relevant to modern America: literature, art, law, science, philosophy, etc. Prerequisite: at least one 3-semester-hour survey course in Greek or Roman literature. (Spring)

138 **Seminar: Classical Studies** (3) Bers
(Formerly Introduction to Classical Studies (2))
Survey of the broad range of sources and resources involved in pursuit

classical studies: standard references, periodicals, library holdings, papyrology, textual criticism, history of classical scholarship.

170 **Women in Classical Antiquity** (3) Norton

In-depth study and discussion of readings from ancient and modern sources on the role of women in Greek and Roman society.

EBREW

IRST GROUP

21–22 **Beginning Hebrew** (3–3) Straus

A year course: credit toward a degree at this University given on completion of Clas 22. Elementary Hebrew grammar, readings from the Old Testament and contemporary literature, composition and conversation. (Academic year)

23–24 **Intermediate Hebrew** (3–3) Porath

Review of grammar; continued development of reading comprehension, composition, and conversation. (Academic year)

ECOND GROUP

103–4 **Advanced Hebrew** (3–3) Seidman

Readings in poetry, prose, Mishnaic Hebrew; survey of Semitic changes and origins; Biblical comparison with Dead Sea Scrolls; required research paper in Hebrew. (Academic year)

Drama

See "Speech and Drama."

East Asian Languages and Literatures

Professor Chung-wen Shih (*Chairman*)
Associate Professorial Lecturers Jane Evans, Thomas Lawton
Assistant Professors G.C.Y. Wang, D.L. Lee

Bachelor of Arts with a major in Chinese Language and Literature in Columbian College of Arts and Sciences (Field-of-Study).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86, including Chin 1–2, 3–4, and 9; or Chin 7–8 and 9; or Chin 5–6 (preferred).
2. The completion of Chin 11–12, 103, 105, 166, 167, and the passing of the major examination at the end of the senior year. The coordinated field of knowledge upon which the student will be examined includes an active command of modern Chinese language and a general knowledge of Chinese literature and culture. A proseminar (Chin 199–200) assists the student in preparation for the major examination.

Bachelor of Arts with a major in Chinese Language and Literature in the School of Public and International Affairs.—See pages 162–66.
Bachelor of Arts with a major in Chinese Studies.—See pages 162–66, 166–67.

CHINESE

FIRST GROUP

Wang

*1–2 **Beginning Mandarin Chinese, Level I** (3–3)

Classroom (3 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 2: Chin 1. Laboratory fee, $17.50 a semester. (Academic year)

Wang

*3–4 **Beginning Mandarin Chinese, Level II** (3–3)

Classroom (3 hours), laboratory (1 hour). Continuation of grammar and spoken Chinese with more emphasis on the written language and reading. Prerequisite to Chin 3: Chin 2 or equivalent. Prerequisite to Chin 4: Chin 3. Laboratory fee, $17.50 a semester. (Academic year)

Lee

5–6 **Beginning Intensive Mandarin Chinese, Levels I-II** (8–8)

Intensive beginner's course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 6: Chin 5. Laboratory fee, $17.50 a semester. (Academic year)

Lee

*7–8 **Beginning Intensive Mandarin Chinese** (6–6)

Intensive beginner's course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 8: Chin 7. Laboratory fee, $17.50 each session.

Wang

*9 **Beginning Mandarin Chinese, Level II** (4)

Reading of simple modern expository writings. Analysis of syntactic structure and practice in writing. Prerequisite: Chin 4 or 8. Laboratory fee, $17.50. (Fall or spring)

Staff

11–12 **Intermediate Intensive Mandarin Chinese** (6–6)

Reading basic texts, writing short pieces, conversation, systematic review of grammar. Prerequisite to Chin 11: Chin 6 or 9. Prerequisite to Chin 12: Chin 11. Laboratory fee, $17.50 a semester. (Academic year)

Evans

91–92 **East Asian Literature—in Translation** (3–3)

Lecture and discussion. Survey of Chinese and Japanese literature, from earliest periods through literary masterpieces of the early 20th century.

SECOND GROUP

Staff

103 **Intensive Readings in Modern Chinese** (6)

Intensive readings in selected modern literary works, social science materials, and documentary materials. Prerequisite: Chin 12 or equivalent. (Fall)

Staff

105 **Introduction to Classical Chinese (Intensive)** (6)

Introduction to classical writing in Chinese literature, history, and philosophy. Prerequisite: Chin 6 or 9. (Spring)

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* The combination of Chin 1–2, 3–4, and 9, or the combination of Chin 7–8 and 9, is equivalent to Chin 5–6.

123–24 **Introduction to Chinese Linguistics** (3–3) Staff

Introduction to the history of the Chinese language. Analysis of linguistic structure of modern spoken Chinese and classical Chinese. Prerequisite: Chin 6 or equivalent, or a course in linguistics.

161 **Chinese Culture** (3) Staff

Lecture and discussion—in English. Survey of Chinese cultural heritage from ancient times to present. (Fall and spring)

166 **Chinese Poetry in Translation** (3) Shih

Open to students who have no knowledge of the Chinese language. General survey of the development of Chinese poetry from ancient times to present. (Fall)

167 **Chinese Fiction in Translation** (3) Evans

Open to students who have no knowledge of the Chinese language. Major works in prose, including classical tales and colloquial fiction such as *Dream of the Red Chamber*, as well as stories by modern prose stylists. (Spring)

171–72 **Poetry of the T'ang and Sung Periods** (3–3) Staff

Reading of works of leading poets. Discussion of content and style. Prerequisite: Chin 103 or equivalent.

173 **Yüan Drama** (3) Shih

Readings of plays by Kuan Han-ch'ing, Ma Chih-Yüan, Cheng Kuang-tsu, Po P'u, and Wang Shih-fu. Prerequisite: Chin 103 or equivalent.

177–78 **Prose Narratives of the Sung, Ming, and Ch'ing Periods** (3–3) Staff

Short stories of the Sung period. Selected readings of Ming-Ch'ing novels. Historical development and stylistic traits. Prerequisite: Chin 103 or equivalent.

179–80 **20th Century Chinese Literature** (3–3) Shih

Short stories of Lu Hsün, Lao She, and others. Informal essays by Lu Hsün, Chou Tso-jen, and Chu Tze-ch'ing. Drama of T'ien Han and Ts'ao Yü. Prerequisite: Chin 103 or equivalent.

185–86 **Directed Reading** (3–3) Staff

Reading of material in the student's field of interest. Admission by permission of instructor. (Academic year)

199–200 **Proseminar: Readings for the Major in Chinese Language and Literature** (3–3) Staff

Conferences and group discussions. (Academic year)

JAPANESE

FIRST GROUP

21–22 **Beginning Intensive Japanese** (8–8) Staff

Intensive beginner's course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Jap 22: Jap 21. Laboratory fee, $17.50 a semester. (Academic year)

Economics

Professors J.W. Kendrick, C.T. Stewart, Jr. (*Chairman*), C.E. Galbreath, Joseph Aschheim, R.P. Sharkey, Henry Solomon, Sar Levitan, Louis De Alessi, Theodore Suranyi-Unger, Jr. (*Research*), Ching-Yao Hsieh, J.L. Gastwirth

Adjunct Professors T.F. Carroll, H.P. Miller, Joseph Grunwald, J.L. Fisher

Professorial Lecturers John Hardt, Eleanor Hadley

Associate Professors Mary Holman, R.Y.C. Yin, W.F.E. Long, S.E. Haber, R.M. Dunn, Jr., G.C. Eads, R.S. Goldfarb

Assistant Professors J.T. Bennett, J.E. Fredland, J.R. Barth, A.M. Yezer

Assistant Professorial Lecturers F.W. Segel, L.L. Perez, Virginia Wright, T.R. Robinson

Bachelor of Arts with a major in Economics (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.)

2. Prerequisite course—Econ 1–2.

3. Required courses in related areas—Math 51 and 52, or equivalent; Stat 111 and 112, or equivalent; 6 semester hours of a Social Study other than Economics.

4. Required courses in the major—Econ 101, 102, 121, 198, and 15 additional semester hours of second-group Economics courses to be approved by the departmental adviser.

Master of Arts in the field of Economics.—Prerequisite: a Bachelor of Arts degree with a major in Economics from this University, or an equivalent degree.

Required: the general requirements, pages 90–97, including (1) Econ 203–4, 205, 279; (2) 12 additional semester hours to be selected from other third-group Economics courses; (3) a Master's Comprehensive Examination in economic theory; (4) completion of a tool requirement (either the passing of a reading knowledge examination in one foreign language or the satisfactory completion of one of the following courses: Math 124, Stat 97, or Stat 157–58); and (5) a thesis (Econ 299–300).

Doctor of Philosophy in the field of Economics.—Required: the general requirements, pages 90–94, 97–99, including (1) Econ 202, 203–4, 205, 215–16, 379 and 380, and 24 additional semester hours of approved graduate course work including Econ 279; (2) passing of the General Examination in Microeconomic Theory, Macroeconomic Theory, and two other fields selected by the student and approved by the doctoral program committee; (3) completion of the tool requirement (the passing of a reading knowledge examination in one foreign language plus the satisfactory completion of Math 124, Stat 97, or Stat 157–58; and (4) a dissertation to demonstrate the candidate's ability to do original research in one of the following fields: Econometrics, Economic Development, Economic History, Economic Policy, Economic Theory, Environmental Economics, History of Economic Thought, Industrial Organization, International Economics, Labor Economics, Mathematical Economics, Monetary Economics, National Income Accounting, Natural Resource Economics, Public Finance, Regional and Urban Economics, and Soviet Economics.

Departmental prerequisite: Econ 1–2 is prerequisite to all other courses in Economics except Econ 217–18.

FIRST GROUP

1–2 Principles of Economics (3–3) — Staff

Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1 is prerequisite to Econ 2. (Econ 1 and 2—fall and spring)

SECOND GROUP

101 Intermediate Microeconomic Theory (3) — Eads, Yin

Analysis of supply, demand, and pricing. (Fall and spring)

102 Intermediate Macroeconomic Theory (3) — Holman, Yin

Theories of national income determination and growth. (Fall and spring)

104 History of Economic Thought (3) — Hsieh

History of the major schools of economic thought, influence of changing problems on the development of economic theory. (Spring)

105 Economics Condition Analysis and Forecasting (3) — Kendrick

Theory and empirical analyses of economic trends and fluctuations, use of economic indicators and simple econometric models, workshop experience in an analysis of an aspect of the U.S. economy. (Fall)

121 Money and Banking (3) — Barth

Nature of money, credit, commercial banking, and other financial institutions in the U.S. monetary system. (Fall and spring)

122 Monetary Theory and Policy (3) — Barth

Analysis of role of money in economic activity in terms of supply of and demand for loanable funds, interest rates and price level. Problems of U.S. monetary policy. Prerequisite: Econ 121. (Spring)

***123 Introduction to Econometrics** (3) — Bennett

Construction and testing of economic models: regression theory, parameter estimation, and statistical techniques applicable to economic models. Prerequisite: Econ 101, 102; Math 31 or 51; Stat 111. (Spring)

130 Comparative Economic Systems (3) — Staff

Critical exposition of fundamental economic concepts and theories of capitalism, communism, socialism, and fascism.

133 Economy of the Soviet Union (3) — Hardt

Development and main features of economic life in the Soviet Union. (Fall)

134 Comparative Communist Economic Systems (3) — Hardt

Analysis of economic development and performance of the Soviet Union and other Soviet-type economies. Institutional aspects and quantitative measures of performance. (Spring)

136 Natural Resources and Environmental Economics (3) — Holman

Analysis of economic problems of natural resources development and utilization and environmental quality. (Spring)

* Interdepartmental course offered by the departments of Economics and Statistics.

142 **Labor Economics** (3) Haber

Analysis of the supply and demand for labor and the functioning of labor markets; unemployment; wage determination and wage differential; poverty. (Fall)

*147 **Economic History of Europe** (3) Sharkey

European economic development since the Middle Ages; emphasis on the period following the Industrial Revolution. Evolution of capitalism and its impact upon the societies of Europe.

157 **Regional and Urban Economics** (3) Yezer

Analysis of the processes of interregional interaction, the urban hierarchy, urban structure, and policies of regional and urban development. (Spring)

158 **Industrial Organization** (3) Eads

Analysis of the structures and production, pricing, and related practices of industries with emphasis on their significance and on appropriate economic policies. (Spring)

160 **Social and Economic Indicators** (3) Staff

161 **Public Finance I** (3) Fredland

Theoretical and institutional analysis of government expenditures, taxation, and intergovernmental fiscal relations. (Fall)

162 **Public Finance II** (3) Fredland

Theoretical and institutional analysis of fiscal policy and debt management. (Spring)

165 **Economics of Human Resources** (3) Stewart

Economic analysis of education and training, medical care, research and development, and other contemporary problems. (Fall)

169 **Introduction to the Economy of Communist China** (3) Yin

Background, organization, and operation of the economy. Appraisal of performance and analysis of problems of development. (Fall)

170 **Introduction to the Economy of Japan** (3) Hadley

Analysis of the structure and growth of the Japanese economy. (Spring)

*179–80 **U.S. Economic History** (3–3) Sharkey

Process of economic growth from Colonial times to the present. Development of various sectors in the economy and their interdependence. Econ 179: 1607–1865. Econ 180: 1865 to present. (Academic year)

181–82 **International Economics** (3–3) Galbreath, Dunn

Econ 181: international trade theory and international monetary theory. Econ 182: continuation of international monetary theory; economic development. (Academic year)

185 **Economic History and Problems of Latin America** (3) Staff

Analysis of present structures and problems of Latin American economies. (Fall)

* Interdepartmental course offered by the departments of Economics and History.

198 **Proseminar in Economics** (3) Holman, Long

Examination of major topics in economic theory and the application of theory and analysis to policy problems. Open only to economics majors in their senior year. (Fall and spring)

199 **Independent Research in Economics** (3) Staff

Under the personal direction of an instructor. Limited to economics majors with demonstrated capacity. Prior approval of instructor required. (Fall and spring)

THIRD GROUP

Third-group Economics courses (except 217–18) are designed for graduate students in Economics or for graduate students with prescribed prerequisites.

202 **History of Economic Thought** (3) Hsieh

Critical analysis and interpretation of the development of economic theory from the 17th century to the present. (Fall and spring)

203–4 **Microeconomic Theory** (3–3) De Alessi, Goldfarb

Econ 203: demand and cost analyses. Econ 204: analysis of the firm; includes market equilibrium, welfare economics, and applications. Prerequisite: Econ 101. (Econ 203 and 204—fall and spring)

205 **Macroeconomic Theory** (3) Hsieh, Barth

Classical, Keynesian, and modern theories of income determination and employment. (Fall and spring)

207 **Business Cycle Analysis** (3) Kendrick

Empirical analysis of American business cycles; evaluation of the methodology and findings of the National Bureau of Economic Research. Statistical tests of theories of the business cycle. (Spring)

208 **National Income** (3) Kendrick

Theory and measurement of economic aggregates within an integrated national income accounts framework, including balance sheets and wealth statements. (Spring)

210 **Economic Methodology** (3) Stewart

Methodology of economics, review of selected theoretical issues in economic theory. Prerequisite: 6 semester hours of graduate courses in economic theory. (Spring)

215–16 **Mathematical Economics** (3–3) Solomon

Formulation and application of mathematical models in economic theory. Prerequisite: a one-year calculus sequence. (Academic year)

217–18 **Survey of Economics** (3–3) Holman

For graduate students in fields other than economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived. (Econ 217 and 218—fall and spring)

223–24 **Monetary Theory and Policy** (3–3) Aschheim

Theory of monetary policy within the framework of contemporary American central banking. (Academic year)

233 **Seminar: Agrarian Reform and Development in Latin America** (3) Carroll

Analysis of Agrarian reform movements and programs in the context of current development issues in Latin American countries. (Fall)

234 **Seminar: Evaluation of Rural Development Projects in Latin America** (3) Carroll

Review of criteria for the design and evaluation of rural investment projects; case studies drawn from the experience of development agencies. (Spring)

235 **Energy Resources and Policy** (3) Fisher

Consideration of economic and related policy issues directed at energy problems.

237 **Seminar: Economics of the Environment and Natural Resources** (3) Holman

Analysis of public policy problems relating to the environment and natural resources development and management. (Fall)

241–42 **Labor Economics** (3–3) Haber

Analysis of labor markets, theories of wages, impact of collective bargaining, causes of unemployment, public policies and programs. (Academic year)

243 **Seminar: Manpower Policy** (3) Levitan

Developments leading to expansion of public investment in manpower resources; evalutaion of goals and operations of publicly supported programs. (Fall)

245–46 **Industrial Organization** (3–3) Eads, Long

(Formerly Econ 265–66)

Structure and performance of the American economy; emphasis on the economics of antitrust policy and the impact of government regulatory policies. (Academic year)

247 **Seminar: Industrial Organization** (3) Long, Eads

Selected topics in regulatory economics and in antitrust economics during alternate years. Topic for 1975: Antitrust Problems. Prerequisite: Econ 101 or equivalent. (Spring)

251–52 **Economic Development** (3–3) Grunwald

Theories and problems of economic growth; special attention to the underdeveloped countries. (Academic year)

253 **Productivity Analysis** (3) Kendrick

Concepts, measurement, and analysis of productivity in business and government at aggregate and organizational levels. (Fall)

255 **Economics of Technological Change** (3) Eads

Economic principles related to determining the proper federal role in influencing civilian-oriented technological change. (Fall)

257 **Regional and Urban Economics** (3) Stewart

Theory of location of economic activities, analysis of interregional equili-

rium and dynamics of regional growth, structure and processes of urban development. (Spring)

259 **Income Distribution** (3) Miller

Theoretical and empirical analysis of income distribution, including analysis of policies related to income inequality. Open to advanced undergraduate Economics majors. (Fall)

261 **Welfare Economics** (3) Stewart

Theories of welfare economics and their applications to public policy; analysis of selected topics in public policy. (Fall)

263 **Theory of Public Finance I** (3) Fredland

Allocation and distribution aspects of government budget policy, including critical analysis of theories and principles of expenditures, taxation, and intergovernmental fiscal relations. (Fall)

264 **Theory of Public Finance II** (3) Fredland

Stabilization aspects of government budget policy: analysis of effects of fiscal policy and debt management on level of employment, prices, and rate of economic growth. (Spring)

267 **Seminar: Soviet Economy** (3) Hardt

Development of the Soviet-type economy. Organization, policies, and problems: monetary, production, allocative, foreign trade, economic growth. Admission by permission of instructor. (Fall)

268 **Seminar: Economic Theory and Development in Communist Countries** (3) Hardt

Appraisal of the Soviet model for economic development in the communist world, especially in Eastern Europe and China. Admission by permission of instructor. (Spring)

269 **Economy of Communist China I** (3) Yin

Analysis of organization, operation, policies, and problems. Development of the economy under communism. (Fall)

270 **Economy of Communist China II** (3) Yin

Continuation of Econ 269, examining critical problems of development. Prerequisite: Econ 269 or permission of instructor. (Spring)

271 **Economy of Japan** (3) Hadley

Analysis of Japanese economic institutions and their contribution to Japan's development. (Fall)

*275 **Econometrics I: Introduction** (3) Bennett

Single equation models of economic behavior. Statistical methods for testing economic hypotheses and estimating parameters. Introduction to simultaneous equations problems. Prerequisite: Stat 157–58 or equivalent, or permission of instructor. (Fall)

*276 **Econometrics II: Simultaneous Equation Models** (3) Bennett

Economic models and simultaneous equations systems. Prerequisite: Econ 275. Recommended: a course in matrix theory. (Spring)

* An interdepartmental course offered by the departments of Economics and Statistics.

*279 **Methods in Economic Statistics** (3) Gastwirth

Application of statistical methods to economics. Curve-fitting, regression, analysis of variance, and chi-square techniques used to analyze economic data. Prerequisite: a one-year course in statistics. (Fall and spring)

281–82 **International Economics** (3–3) Dunn

Econ 281: theory of international trade and factor movements. Econ 282: theory of balance-of-payments adjustment. (Academic year)

287 **Seminar: Problems in Latin American Civilization** (3) Staff

Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

298 **Reading and Research** (3)

Limited to Master's degree candidates. (Fall and spring) Staff

299–300 **Thesis Research** (3–3)

(Fall and spring)

FOURTH GROUP

Fourth-group Economics courses are limited to graduate students and are primarily for doctoral candidates. They are offered as the demand requires.

312 **Seminar: Price Theory** (3) De Alessi

Discussion of topics of price theory from recent journal articles.

313 **Seminar: Economic Thought** (3) Hsieh

Continuation of Econ 202. Principal trends in economic thought.

315 **Seminar: Topics in Mathematical Economics** (3) Solomon

Intensive study of selected topics, including economic activity analysis, risk and uncertainty, and other topics of current interest. Prerequisite: Econ 215–16.

321 **Seminar: Monetary Theory** (3) Aschheim

Recent developments in monetary theory. Staff

341 **Seminar: Labor Economics** (3)

Current problems in theory and policy. Staff

363 **Seminar: Public Finance** (3)

Selected topics of current interest. Staff

*378 **Seminar: Topics in Econometrics** (3)

A research seminar covering current econometric literature and special topics. Admission by permission of instructor. Sharkey

†379–80 **Readings in Economic History** (3–3)

Econ 379: American economic history. Econ 380: modern European economic history. Prerequisite: the appropriate second-group preparation and consent of instructor. (Academic year)

* An interdepartmental course offered by the departments of Economics and Statistics.
† An interdepartmental course offered by the departments of Economics and History.

390 **Seminar: International Economic Theory** (3) Staff

Examination of recent contributions in this field.

391 **Seminar: International Economic Policy** (3) Staff

Topics selected from current significant policy problems.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Education

Professors W.T. Carroll, Carol St. Cyr, Mary Ellen Coleman, Daniel Sinick, R.E. Baker, Martha Rashid, Rodney Tillman, Anthony Marinaccio, L.H. Elliott, Leonard Nadler, Marcella Brenner, J.G. Boswell, C.E. Vontress

Professorial Lecturers W.W. Chase, D.D. Darland, Allan Drexler, Norman Drachler, C.J. Kolson, W.J. Mars, Robert Chisholm, E.J. Gleazer, Jr., F.W. Kovacs

Associate Professors Margaret McIntyre, R.J. Frankie, Dorothy Moore, Lawrence Winkler, Donald Linkowski (*Chairman*), E.P. Kulawiec, Gloria Horrworth, Ruth Peterson, G.D. Wiggs

Associate Professorial Lecturers LuVerne Walker, Beverly Heinle, Martha Ware, P.E. Arsenault, K.W. Rollins, David Iwamoto, Samuel Kavruck, John Woodburn, A.C. Jensen, Sara Moretz, E.F. Rhodes, George Nixon

Assistant Professors S.R. Paratore, G.W. Smith, J.A. Kuhagen (*Research*), Janet Heddesheimer

Adjunct Assistant Professor Nancy Roche

Assistant Professorial Lecturers R.J. Kubalak, Shirley McCune, J.D. Gates, Marianne Phelps, V.E. Greaver, R.E. McNelis, Agnes Lawless, Sally Boss, Lu Juana Butts, J.H. White, Eloise Calkins, D.L. Celio, D.C. Kinlaw, C.S. Rockefeller III, D.G. Speck

Programs of study leading to the degrees of *Bachelor of Arts in Education, Master of Arts in Education, Master of Arts in Teaching, Education Specialist,* and *Doctor of Education* are offered by the School of Education (see pages 102–29).

SECOND GROUP

Educ 136, 137, 138, 139, 140, 142, 144, and 146 are special methods courses which are to be elected in the senior year by students in the secondary school curriculum after substantial preparation in the teaching fields concerned. Course requirements and hours of credit vary with license requirements. Practices of successful teachers studied; actual teaching content as found in current texts and courses of study reviewed. Prerequisite to all special methods courses: Educ 108, 123, and 131. Additional prerequisites are stated under each course.

108 **Human Development, Learning, and Teaching** (3) Staff

Lecture (2 hours), field work (3 successive hours each week, preferably

in the morning, arranged by the Director of Laboratory Experiences). Principles of effective teaching based on an understanding of human development and the nature of learning. Prerequisite: Psyc 22; Psyc 29 or 112. (Fall and spring)

111 **Elementary School Curriculum and Methods** (15) Moore and Staff

For seniors. Curriculum and methods of teaching in the elementary school: reading, children's literature, mathematics, science, language arts, social studies, music, art, physical education. Pre-student teaching one and one-half days a week. Prerequisite: Educ 108 and 123. (Fall)

112 **Educational Measurement** (3) Staff

Scope, needs, services to students, selection and construction of teacher-made tests, interpretation of tests for evidence purposes. Prerequisite: Educ 108 and 123. (Fall and spring)

113 **Elementary School Art** (3) Heinle

Lecture and laboratory (3 hours), field work—as arranged. For undergraduates in the elementary school curriculum. Materials and methods. Material fee, $5. (Spring)

114 **Elementary School Music** (3) Staff

For undergraduates in the elementary school curriculum. Program of music activities essential to basic musical understanding. Materials and techniques.

115 **Elementary School Teaching of Reading** (3) Staff

Introduction to methods, techniques, materials, and activities essential to a good elementary school reading program. Prerequisite: Educ 108 and 123, or teaching experience.

118 **Elementary Reading: Classroom Diagnosis and Instruction** (3) Staff

Emphasis on diagnostic procedure aimed at individualizing and improving classroom instruction. Prerequisite: Educ 115 or equivalent. Concurrent registration in Educ 119 required for students in the M.A.T. in elementary education degree program. (Fall and spring)

119 **Elementary School Curriculum and Methods** (9) Horrworth and Staff

Limited to students in the M.A.T. in elementary education degree program. Curriculum, methods, and materials of reading, language arts, social studies, mathematics, science, music, art and physical education. Appropriate field experience coordinated during elementary school field openings. Concurrent registration in Educ 118 required. (Fall)

123 **Society and the School** (3) Brenner, Drachler

Historical and social development of education, contemporary issues, co-operation of the school with other community agencies, functions of school personnel. (Fall and spring)

124 **Communication Skills and Interpersonal Relationships** (3) Brenner

Theory and practice in the development of professional relationships: teacher-child, teacher-parent, teacher-supervisor, utilizing interview and other activities. (Fall)

128 **Children's Literature** (3) Walker, McIntyre

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development, children's original expressions. (Spring)

130 **Internship in Elementary Education** (6) Horrworth and Staff

Limited to students in the M.A.T. in elementary education degree program. Full-time teaching in an elementary school under cooperative supervision of the school system and the University staff. Admission by permission of instructor. Prerequisite: Educ 119, 135. (Spring)

131 **Secondary School Principles and Methods** (3) Boswell, Kulawiec

For seniors. Classroom management and teaching techniques for initiating, guiding, and evaluating learning activities. Group-work to be arranged. Prerequisite: Educ 108 and 123. (Fall)

132 **Student Teaching in Early Childhood Schools** (6 to 9) McIntyre

For seniors. Admission by permission of instructor. Prerequisite: Educ 111 or equivalent; Educ 152, 153. (Fall and spring)

133 **Supervised Experience in Education** (3 to 6) Staff

Field work, internship, and instructional practice: (1) adult education and human resource development (Wiggs); (2) college student development experience (Kirkbride); (3) higher education (Frankie). Admission by permission of instructor. (Fall and spring)

134 **Student Teaching in Secondary Schools** (6 to 9) Boswell, Kulawiec, and Staff

For seniors. Admission by permission of instructor. Prerequisite: Educ 131. (Fall and spring)

135 **Student Teaching in Elementary Schools** (6 to 9) Horrworth, Moore, and Staff

For seniors and for students in the M.A.T. in elementary education degree program. Admission by permission of instructor. Prerequisite for seniors: Educ 111 or equivalent. Prerequisite for M.A.T. students: Educ 220. (Seniors—fall and spring; M.A.T. students—fall)

136 **Teaching English in Secondary Schools** (3) McNelis

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours in English. (Spring)

137 **Teaching Speech** (3) Staff

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours in speech or permission of instructor. (Spring)

138 **Teaching Social Studies in Secondary Schools** (3) Boswell

Lecture (2 hours), field work (2 hours). Prerequisite: 24 semester hours of social studies. (Spring)

139 **Teaching Art in Secondary Schools** (3) Heinle

Lecture (2 hours), laboratory (2 hours). Prerequisite: 24 semester hours of Art. Material fee, $5. (Spring)

140 **Teaching Mathematics in Secondary Schools** (3) Gates
Lecture (2 hours), field work (2 hours). Prerequisite: mathematics through calculus. (Spring)

142 **Teaching Music in Secondary Schools** (3)
Prerequisite: 24 semester hours of music.

144 **Teaching Science in Secondary Schools** (3) Woodburn
Lecture (2 hours), field work (2 hours). Prerequisite: 24 semester hours of science. (Spring)

146 **Teaching Foreign Languages** (3) Kulawiec
Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours of one foreign language. (Spring)

150 **Foundations of Early Childhood Education** (3) McIntyre
Admission by permission of instructor. (Fall)

152 **Early Childhood Curriculum** (3) McIntyre
Admission by permission of instructor. (Fall)

153 **Role of the Professional in Early Childhood Education** (3) McIntyre
Admission by permission of instructor. (Spring)

154 **Community Resources and Materials for the Young Child** (3) McIntyre
Admission by permission of instructor. (Spring)

THIRD GROUP

Departmental prerequisite: A degree from an accredited institution is prerequisite to all third-group courses in Education. Adequate professional preparation is prerequisite to all third-group courses in Education except for those courses limited to students in the M.A.T. degree program.

201–2 **Seminar: International Education** (3–3) Moore
For teachers and other educators. Survey of selected foreign educational systems and cultures. Research, techniques, and materials to develop world-mindedness. Embassy resources utilized.

203–4 **Comparative Education** (3–3) Staff
A systematic investigation of the educational structure and practices of selected representative school systems throughout the world.

205–6 **The Curriculum** (3–3) St. Cyr
For experienced teachers. Educ 205: curriculum foundations and issues, comparison of curriculum patterns. Educ 206: curriculum development in subject areas, group consideration of student problems. (Academic year)

207 **Curriculum Materials** (3 to 6) St. Cyr
For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations.

208 **Human Development** (3) Rashid

Consideration of human development and behavior throughout the life span; emphasis on practical implications of relevant interdisciplinary research. (Fall and spring)

209 **Child Development** (3) Rashid

Interdisciplinary approach to child development and behavior. Practical implications of research in disciplines contributing to knowledge about childhood. (Fall and spring)

210 **Adolescent Development** (3) Rashid

Interdisciplinary approach to adolescent development and behavior. Practical implications of research in disciplines contributing to knowledge about adolescence. (Spring)

212 **Quantitative Methods I: Measurement** (3) Paratore, Smith, and Staff
(Formerly Educational Measurement)

Basic measurement techniques; selection, administration, and interpretation of standardized tests; construction, selection, and interpretation of questionnaires, personality inventories, and other data-gathering instruments used in research. (Fall and spring)

213–14 **History of Education** (3–3) Greaver

Educ 213: European backgrounds of American education. Educ 214: evolution of the American school system. (Academic year)

216 **Education of Slow-learning Children** (3) Staff

Identification, nature, and needs of slow-learning elementary and junior high school children. Emphasis on diagnosis and treatment of learning difficulties.

217–18 **Philosophy of Education** (3–3) Darland

Educ 217: to help students formulate a personal philosophy of education. Educ 218: social foundations of education—forces that shape policies and offerings of the school. (Academic year)

219 **Elementary School Classroom Procedures** (3) Baker

Current theories of teaching and learning and their application to teaching acts and strategies of elementary school teachers.

220 **Elementary School Teaching Foundations** (9) Horrworth and Staff

Limited to students in the M.A.T. in elementary education degree program. Introductory block course dealing with the content of professional education courses; history and philosophy of education; educational psychology; human development, learning, and teaching; society and the school; elementary school organization. 160 class hours supplemented by field experience.

223 **Foundations of Reading Instruction** (3) Coleman, Peterson

Historical and psychological background; evaluation of recent methods, materials, and techniques in teaching reading; demonstrations of diagnostic and teaching techniques. (Fall)

224 **Reading Problems** (3) Coleman

Elementary school reading difficulties; classroom and clinical techniques in testing and teaching. Prerequisite: one or more years of recent teach-

ing experience and a previous course in reading or language arts. (Spring)

226 **Reading in Secondary School and College** (3) Coleman

Methods, techniques, and materials necessary for developing efficient reading skills, including skills in content subjects; organizing and evaluating reading programs. (Spring)

227 **Basic Issues in Elementary Education** (3) Baker

Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school. (Fall)

228 **Instructional Areas in Elementary Education** (3) Baker

Current trends and research on reading, language arts, social studies, mathematics, science, music, art, and physical education. (Spring)

229 **Administration of Elementary Education** (3) Carroll

For experienced teachers and administrators. Achieving instructional objectives, organizing and servicing teaching activities, coordinating school and community life. (Fall)

230 **Intern Seminar for M.A.T. Students** (3) Horrworth

Planning and supervision of individual action research projects. (Spring)

231 **Secondary School Classroom Procedures** (3) Boswell

Current classroom practices: teacher-pupil planning, group procedures, initiatory and culminating activities, individual and group evaluation techniques, teaching aids, etc.; review of recent literature.

232 **Supervision of Elementary Education** (3) Carroll

For experienced teachers and administrators with two or more years of teaching experience. Review of modern supervisory concepts, including practices in the operation of the elementary school. (Spring)

233 **Audio-visual Education** (3) Kubalak

Lecture (2 hours), laboratory (1 hour). Selection, evaluation, and use of audio-visual materials; administrative problems in care, operation, maintenance, and use of such materials and equipment. Material fee, $7. (Spring)

235 **Analysis of Teaching** (3) Boswell

Techniques of analyzing teaching styles and classroom interactions. (Fall)

236 **Introduction to Education Technology** (3) Cottrell

Consideration of historical perspective, process, instrumentation, and implementation of self-instructional systems. (Fall)

237 **Systems Approach to Instructional Design** (3) Staff

Application of systems techniques to the development of an instructional program. (Spring)

241 **Education of the Gifted** (3) Staff

For classroom teachers. Nature and discovery of giftedness, provisions for the gifted in regular classes, experimental projects.

243 **Human Relations in Education** (3) Marinaccio

Principles and practices in human relations between and among learner, teacher, other school personnel, and parents.

245 **School and Community** (3) Jensen

The school as an important member of a team of social agencies that builds the community.

246 **Administrative Issues in Urban Education** (3) Staff

Investigation of current issues in urban education. (Fall and spring)

247 **Adult and Preprofessional Technical and Occupational Education** (3) Wiggs

(Formerly Adult Occupational Education)

Development, current concepts, agencies involved, problems, and trends in adult vocational-technical-occupational education in the United States and foreign countries.

249 **Drug Treatment and Resources** (3) Staff

Individual, social, and cultural factors related to drug abuse. Rehabilitative methods in treating drug abusers; use of community resources.

250 **Counseling Drug Abusers** (3) Staff

Counseling theory and practice applied to drug abusers. Crisis intervention, self-help groups, and family therapy; individual and group counseling.

251 **Foundations of Guidance and Personnel Services** (3) Heddesheimer

Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues. (Fall and spring)

252 **Organization and Administration of Guidance Services** (3) Vontress

Procedure and practice in organizing and administering school guidance and pupil personnel programs. Admission by permission of instructor. (Spring)

253 **Analysis of the Individual for Purposes of Counseling** (3) Winkler

Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: Educ 112 or equivalent. (Fall and spring)

254 **The Middle School** (3) Kulawiec

Development, organization, and practices; emphasis on the learner, the teacher, the administrator, the curriculum, and the setting of the school for the preadolescent. (Fall)

255–56 **Secondary Education** (3–3) Kulawiec

Examination of historical, psychological, sociological, and philosophical bases; emphases on prescriptive implications. Special attention to contemporary problems and practices. (Academic year)

257 **Educational and Occupational Development** (3) Sinick, Vontress

Theories of career development; factors influencing the world of work; procedures for evaluating and using socio-personal, educational, and occupational information. (Fall and spring)

258 Techniques of Counseling (3) Vontress

Theories and practices of vocational, educational, and personal counseling. Prerequisite: 12 semester hours in guidance and counseling, including Educ 253 and 257. (Fall and spring)

259 Secondary School Administration (3) Marinaccio

For experienced teachers and administrators. Survey of administration, including practices of the modern high school. (Fall)

260 Secondary School Supervision (3) Marinaccio

For experienced teachers and administrators. Review of modern supervisory concepts, including practices in schools. (Spring)

261 Practicum in Counseling (3) Heddesheimer

(Formerly Practicum in Guidance (3 to 6))

Intensive counseling experience under supervision. Emphasis on relationship dynamics, analysis, recommendations, and follow-up. Prerequisite: Educ 258. (Fall and spring)

262 Internship: Counseling (3) Heddesheimer

Counseling experience under University and institutional supervision in a variety of settings. Prerequisite: Educ 261. (Spring)

263 Human Resource Development: Training and Education (3) Wiggs, Nadler

Concepts and purpose, historical backgrounds, roles of human resource development personnel, program areas. Prerequisite: adequate professional preparation or experience in training, education, and development. (Fall)

264 Program Planning in Human Resource Development (3) Nadler

Training, education, and development programs for various client systems will be planned using critical events conceptual model. Field work. Prerequisite: Educ 263 and permission of instructor. (Spring)

269–70 School Business Management (3–3) Marinaccio

Educ 269: philosophy, responsibilities, and functions of the business management office in public education institutions. Educ 270: practicum in educational business management. (Academic year)

271 The Teacher and School Administration (3) Carroll, Marinaccio

Role of federal, state, and local administrative units; school finance; legal controls; school plant; public support; improving teaching conditions. (Fall and spring)

272 The Teacher and School Supervision (3) Carroll, Tillman

Nature, organization, human relationships, and techniques. (Fall and spring)

273–74 Teacher Education (3–3) Boswell

Educ 273: aims, objectives, and basic issues; study of outstanding and experimental programs. Educ 274: recruitment and selection, general education, teaching-field preparation, professional sequences, laboratory experiences. (Academic year)

275 **Seminar: School Finance** (3) Carroll

Educational financial theory, practice, and control, including methods of financing. (Fall)

276 **Seminar: Public Relations in School Administration** (3) Carroll

Purposes, gathering materials, disseminating agencies, publicity media, public participation in policy-making. (Spring)

278 **School Law** (3) Ware

Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group. (Spring)

279 **Adult Education** (3) Nadler, Wiggs

Current concepts and objectives, historical development, agencies involved, personnel, clients, programs on all levels—community through international. (Fall)

280 **Program Planning in Adult Education** (3) Wiggs

Determining educational needs for adults at all levels in school and nonschool agencies; planning programs and instruction; budgeting and scheduling of adult programs. Field work with actual sponsoring agency. Prerequisite: Educ 279 and permission of instructor. (Spring)

283 **Higher Education in the United States** (3) Staff

Development, scope, purpose, present status, programs, and trends in higher education in the United States. (Fall and spring)

284 **Administration of Higher Education** (3) Marinaccio

Government, organization, and administration of colleges and universities; duties of trustees and administrators. (Fall and spring)

285 **Student Activities** (3) Speck

Nature and purposes of selected activities—homeroom, clubs, assemblies, school publications, student council, interscholastic contest; attention to sponsorship, participation, finance, and evaluation.

287–88 **Clinical Study of Reading Problems** (3–3) Coleman, Peterson

For advanced students. Diagnostic and corrective work under supervision in the Reading Center. Prerequisite: Educ 223 and 224 or 226, or equivalent. Material fee, $10 a semester. (Academic year)

289 **Supervisory Problems in Reading** (3) Kolson

For experienced teachers, principals, supervisors, and superintendents. Problems in planning, reorganizing, and improving the total reading program. (Fall)

290 **Severe Learning Disabilities in Reading** (3) Peterson

(Formerly Diagnosis and Instruction—Severe Reading Problems)

For experienced teachers. Case studies of children and/or adults with severe reading problems, planning and implementing instructional programs. Admission by permission of instructor. Material fee, $10. (Spring)

291 **Planning the School Plant** (3) Chase

Selection of sites; evaluation of existing buildings; utilization of present

facilities; adaptation to curricular needs; building, operation, and maintenance problems. (Fall)

293–94 **Research and Independent Study** (3–3) Staff
Individual research under guidance of a staff member. Program and conferences arranged with an instructor. (Academic year)

295 **Quantitative Methods II: Research Procedures** (3) Paratore, Smith, Winkler
(Formerly Research Methods and Procedures)
Required of all candidates for graduate degrees in Education. Analysis of scientific approaches to problems in education; evaluation of research techniques. Prerequisite: Educ 212 or equivalent. (Fall and spring)

297 **Personnel Administration** (3) Carroll
Organization and administration of personnel programs for educational institutions. Basic philosophy, principles, responsibilities, and functions.

298 **Seminar: Personnel Administration** (3) Carroll
Research: policies, rules and regulations, staff organizations, negotiations.

299–300 **Thesis Research** (3–3) Staff
Required of M.A. in Ed. degree candidates writing Master's theses. (Fall and spring)

301 **Data Processing in Education** (3)
Machine accounting and computer technology for counselors, teachers, and administrators.

302 **Quantitative Methods III: Inferential Techniques** (3) Paratore, Smith
Educ 302 or Stat 105 is required of all doctoral students in Education. Prerequisite: Educ 295 or a basic statistics course and permission of instructor. (Fall and spring)

303 **Data Analysis** (3) Linkowski
Use of computer in data analysis. For doctoral students at the dissertation-planning stage. (Fall)

304 **Practicum in Supervision** (3 to 6) Marinaccio
Supervised practical experience in supervision of instruction. Admission by permission of instructor.

305 **Internship: Supervision** (3 to 6) Marinaccio
Service in a school situation directed by the University and school systems to integrate theory and practice.

306 **Quantitative Methods IV: Advanced Research Design** (3) Paratore, Smith
(Formerly Educ 296 Seminar: Educational Research)
Required of all doctoral students in Education. Evaluation and application of educational research designs. Prerequisite: Educ 302 or equivalent. (Fall and spring)

316 **Curriculum Developments in Elementary School Social Studies** (3 to 6) Moore
For experienced educational personnel. Research, techniques, materials.

and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor.

317 **Curriculum Developments in Elementary School Science** (3 to 6) St. Cyr

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor.

320 **Curriculum Developments in Elementary School Mathematics** (3 to 6) St. Cyr

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor. (Spring)

321 **Practicum in Curriculum** (3 to 6) St. Cyr

Supervised field experience in curriculum. Admission by permission of instructor. (Fall and spring)

322 **Internship: Reading** (3 to 6) Staff

Limited to doctoral students in Education. Experience in a selected area of college teaching. (Fall and spring)

323 **Internship: Reading** (3 to 6) Staff

Limited to doctoral students in Education. Service in a school situation directed by the University and school system to integrate theory and practice. (Fall and spring)

330 **Foundations of Early Childhood Education** (3) McIntyre

Historical developments, philosophy and objectives of nursery schools, kindergartens and day care centers, exploration of contemporary programs and models with curriculum implications. (Fall)

332 **Early Childhood Curriculum** (3) McIntyre

Content, approaches, methods, and materials in language arts, mathematics, science, health, social studies, and creative arts. (Fall)

333 **Role of the Professional in Early Childhood Education** (3) McIntyre

Planning, reporting, records, teacher-child and teacher-family interaction, diagnosis and evaluations, working with paraprofessionals. (Spring)

334 **Community Resources and Materials for the Young Child** (3) McIntyre

Interaction with community for services and resources; physical facilities, including play activities and materials for the young child. (Spring)

335 **Practicum in Early Childhood Education** (3 to 6) McIntyre

Supervised professional activity in selected early childhood programs; seminar. Prerequisite: 12 semester hours in early childhood education and permission of instructor. (Fall and spring)

336 **Practicum in Reading** (3) Coleman, Peterson, and Staff

Supervised experience in testing and teaching in the Reading Center. Approximately 120 class hours required. Laboratory fee, $10. Admission by permission of instructor. (Fall and spring)

341 **Cognitive Models and Instructions** (3) Rashid

Cognitive models (Guilford, Piaget, etc.) are analyzed as the theoretical basis for planning instructional episodes appropriate at various levels—childhood through young adulthood. (Fall)

342 **Language Development** (3) Rashid

Nature of language development; role of language in the socialization process. (Spring)

354 **Counseling of Minority Groups** (3) Vontress

Consideration of problems and approaches related to counseling cultural and racial minorities in American society; emphasis on counseling the disadvantaged in urban areas.

355 **Counseling in Groups** (3) Rollins

Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling. (Fall)

356 **Seminar: Guidance and the Disciplines** (3) Staff

For experienced counselors. Exploring the foundations of guidance through the disciplines of psychology, sociology, economics, anthropology, and philosophy.

357 **Mental Hygiene** (3) Winkler

Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents. (Fall and spring)

361 **Medical Aspects of Rehabilitation Counseling** (3) Sinick

Etiology, symptomatology, and treatment of chronic and traumatic disorders with rehabilitation counseling implications. Admission by permission of instructor. (Fall)

362 **Client Evaluation in Rehabilitation Counseling** (3) Sinick

Test and nontest methods of furthering client and counselor understanding. Prerequisite: Psyc 131. (Spring)

363 **Psychosocial Aspects of Rehabilitation Counseling** (3) Linkowski

Impact of congenital and later disabilities on attitudes, self concepts, and motivations. Implications for rehabilitation counseling. Admission by permission of instructor. (Fall)

364 **Middle-management in Rehabilitation** (3) Kuhagen

Technical and interpersonal aspects of supervisory and other management responsibilities related to professional and support personnel. Theory and practice in case management and staff development. Cast study and role playing.

365–66 **Field Work in Rehabilitation Counseling** (3–3) Kuhagen, Sinick

Field work of one full day a week. Educ 365: concurrent seminar including history, philosophy, and introduction to practice. Educ 366: concurrent seminar including job analysis, placement, and follow-up. Admission by permission of instructor. (Academic year)

367–68 **Internship: Rehabilitation Counseling** (6–6) Kuhagen

Supervised practice of three full days a week, with seminar providing

integration of theory and practice. Prerequisite: Educ 365–66. (Academic year)

369 **Professional Issues in Rehabilitation Counseling** (3) Staff

Culminating seminar covering professional problems and ethical issues, Prerequisite: Educ 367. (Spring)

370 **College Students and Their Community** (3) Speck

Survey of literature on the characteristics, behavior, and attitudes of the contemporary college student; college student interaction with his environment. Admission by permission of instructor. (Fall)

371 **Introduction to College Teaching** (3) Frankie

General principles, methods, techniques, and experimental instructional media for teaching at the college and university level. (Fall)

372 **Internship in College Teaching** (3 to 6) Frankie

Supervised experience in a selected area of college teaching. Prerequisite: Educ 371. Admission by permission of instructor. (Spring)

373 **The Junior-Community College** (3) Gleazer

The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges. (Fall)

374 **Current Issues in Higher Education** (3) Elliott, Marinaccio

Prerequisite: Educ 283, 284. (Spring)

375 **Foundations of a College Student Development Program** (3) Kirkbride

College student development as an integral part of higher education programs. (Fall)

376 **College Student Development and Campus Groups** (3) Kirkbride

Principles and procedures of student development programs with campus groups; campus group activities and development of student leadership. (Spring)

377 **Practicum in College Student Development** (3 to 6) Kirkbride, Phelps

Supervised practical experience in college student development programs. Admission by permission of instructor. (Fall and spring)

378 **Practicum in Teacher Education** (3 to 6) Brenner, Boswell

For selected experienced teachers. Supervised field work relevant to student's professional needs, to be arranged. (Fall and spring)

379 **Practicum in Adult Learning Programs** (3 to 6) Nadler

(Formerly Practicum in Adult Education)

Supervised practical experience in various forms of adult education and human resource development. Admission by permission of instructor. (Fall and spring)

380 **Sensitivity Training: Laboratory Method** (3) Drexler

A sensitivity learning experience in human relations using unstructured group experience, individual feedback, experimentation, and practice.

Admission by permission of Department, prior to registration. (Fall and spring)

381 **Adult Learning** (3) Wiggs
(Formerly The Adult as a Learner)
Learning theories as applied to adults in individual and group learning transactions; effect of age on learning; psychological, physical, and social environment in adult education situations. (Fall and spring)

382 **Methods and Techniques of Adult Learning** (3) Nadler
(Formerly Methods in Adult Education)
Methods, techniques, and devices for adult learning; developing action-oriented learning situations in adult learning programs. (Spring)

383 **Counseling of Adults** (3) Wiggs
Theories and practical application of personal counseling, emphasizing distinct needs of adults and young adults in occupational settings; for counselors in military, government, business, and industry. (Fall)

384 **Evaluation of Adult Learning Programs** (3) Nadler
(Formerly Evaluation of Adult Education)
Measurement and evaluation of adult learning programs in school and nonschool agencies—business, industry, government, voluntary organizations, and community.

385 **Collective Negotiations in Higher Education** (3) Rhodes
Theory, practice, problems, and issues in collective negotiations in higher education.

386 **Current Issues in Adult Learning Programs** (3) Wiggs
(Formerly Current Issues in Adult Education)
For M.A. in Ed. degree candidates. Current issues and trends in the fields of adult education and human resource development. Admission by permission of instructor. (Spring)

387 **Administration of Adult Learning Programs** (3) Staff
(Formerly Administration of Adult Education)
Program administration, staff recruitment and development, fiscal operations, facilities, and maintenance of effective community relations. (Spring)

388 **Case Studies in Higher Education Administration** (3) Staff
Limited to advanced doctoral students in Education. Analysis of selected hypothetical cases related to essential administrative functions of colleges and universities. Admission by permission of instructor.

389 **Consultant-Client Relationships in Human Resource Development** (3) Nadler
Examination of the consulting process, consultant-client behaviors, and dilemmas using theory and field experience. Prerequisite: Educ 264, 280 or approval of instructor. (Fall)

390 **Legal Problems in Higher Education** (3) Frankie

Investigation of legal problems in higher education related to administration, students, faculty, and academic program. (Spring)

391 **College and University Curriculum** (3) Frankie

Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum. (Fall)

392 **Financing Higher Education** (3) Frankie

Analysis of private, state, and federal revenue sources; student aid, program budgets, and financial methods and practices. (Spring)

393 **Practicum in Higher Education** (3 to 6) Staff

Supervised field experiences in higher education; reports and conferences. Admission by permission of instructor. (Fall)

394 **College and University Governance** (3) Marinaccio

Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 284. (Fall)

395 **Problems and Practices in School Administrative Organization** (3 to 6) Marinaccio

Application of principles and practices concerned with change and evaluation of educational administration.

396 **Internship: Higher Education Administration** (3 to 6) Marinaccio

Service in a higher education situation directed by the University and the cooperating institution to integrate theory and practice. (Fall and spring)

397 **Internship: Elementary Administration** (3 to 6) Carroll

Service in a school situation directed by the University and school system to integrate theory and practice. (Fall and spring)

398 **Internship: Secondary Administration** (3 to 6) Marinaccio

Service in a school situation directed by the University and school system to integrate theory and practice. (Fall and spring)

399 **Seminar: Applied Educational Administration** (3 to 6) Carroll

Application of the theories and principles of administration to the public schools. Student participation with guidance by recognized regional practitioners.

400 **Special Workshop in Education** (arr.)

Topics to be announced in *Schedule of Classes*. May be repeated for credit.

FOURTH GROUP

A Master's degree from an accredited institution is prerequisite to all fourth-group courses. All fourth-group seminars are open to doctoral candidates or other post-Master's degree students with approval of instructor. Study is individually planned on the basis of previous study and experience in the subject field to attain an advanced level of competence and meet identified professional needs or field requirements.

Each of the following courses is offered fall and spring. Each course may be repeated for credit.

401 **Seminar: History of Education** (arr.) — Greaver

403 **Seminar: Philosophy of Education** (arr.) — Darland

405 **Seminar: Human Growth and Development** (arr.) — Rashid

411 **Seminar: Elementary Education** (arr.) — Baker

413 **Seminar: Secondary Education** (arr.) — Kulawiec

421 **Seminar: Adult Education** (arr.) — Nadler

422 **Seminar: Higher Education Administration** (arr.) — Marinaccio

423 **Seminar: Higher Education** (arr.) — Marinaccio

424 **Seminar: College Student Development** (arr.) — Kirkbride

425 **Seminar: Teacher Education** (arr.) — Boswell, Baker

427 **Seminar: Human Resource Development** (arr.) — Nadler

429 **Seminar: Educational Personnel Administration** (arr.) — Carroll

431 **Seminar: Administration** (arr.) — Carroll, Marinaccio

433 **Seminar: Supervision** (arr.) — Carroll, Marinaccio

434 **Seminar: Elementary Supervision** (arr.) — Carroll

435 **Seminar: Elementary Administration** (arr.) — Carroll

436 **Seminar: Secondary Supervision** (arr.) — Marinaccio

437 **Seminar: Secondary Administration** (arr.) — Marinaccio

441 **Seminar: Curriculum** (arr.) — St. Cyr

443 **Seminar: Guidance and Counseling** (arr.) — Vontress

445 **Seminar: Research and Evaluation** (arr.) — Paratore, Smith

446 **Seminar: Reading** (arr.) — Staff

490 **Pre-dissertation Seminar** (3) — Staff
(Formerly Dissertation Seminar)
Required of all Ed.D. degree candidates. Approval of the dissertation prospectus is necessary for successful completion of the seminar. Admission by permission of instructor.

491 **Dissertation Research** (arr.) — Staff
Preparation of a research outline; research and writing of an approved doctoral dissertation under the direction of major adviser and dissertation committee. Prerequisite: Educ 490.

English

Professors C.D. Linton, R.H. Moore, J.H. Coberly (*Emeritus*), P.H. Highfill, Jr., J.G. Allee, Jr., J.P.Reesing, Jr., Milton Crane, E.R. Weismiller, R.N. Ganz, Jr., G.E. McCandlish (*Chairman*)
Adjunct Professor J.C. Broderick
Associate Professors W.L. Turner, Muriel McClanahan, A.E. Claeyssens, Jr., R.C. Rutledge, J.A. Quitslund, Judith Plotz
Assistant Professors T.M. Scanlan, C.W. Sten, G.R. Bozzini, Agnes Cannon, R.L. Combs
Instructors J.J. O'Connell, Jr., Ann Romines, David McAleavey, Gail Paster, Cynthia Walker
Lecturers Elna Broffman, Monica Finkel, Catherine Bahl, Faye Moskowitz, Susan Bahcall, John Donahue, Valeska Ellis, Eileen McClay, Betsy Sterman

Bachelor of Arts with a major in American Literature or *English Literature (Field-of-Study or Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Engl 51–52 or 71–72 or 91–92.

3. Required courses in related areas—(a) 12 semester hours of a foreign language (Classical Hebrew, Greek, Latin, French, German, Italian, Russian, or Spanish), or equivalent; (b) 6 semester hours of Philosophy and/or Religion; (c) 6 semester hours of History (English, American, European, or World).

4. Required for the major:

(a) *Field-of-Study major*—the passing of the major examination in either American or English Literature at the end of the senior year. No set pattern of courses is prescribed. The student is expected to engage himself more or less systematically with writers and works from the whole chronological span of American literature or English literature. The field-of-study major offers an opportunity during the student's senior year for work in special seminars, and, for honors candidates, independent study. A Proseminar in American Literature, Engl 199–200, and a Senior Seminar in English Literature, Engl 159 and/or 160, assist students in their preparation for the major examination. *Students who wish to be candidates for graduation with Special Honors in either American or English Literature must be in the field-of-study major.*

(b) *Departmental major*—30 semester hours of second-group courses offering experience with several approaches to literature which, together, make a discipline of literary study—practical criticism, history of literature, literary period(s), genre(s), and major author(s)—distributed as follows:

American Literature majors—24 semester hours of American Literature courses, including Engl 161–62; 6 hours of English Literature courses.

English Literature majors—15 semester hours of English Literature courses, including Engl 121, 122, a 3-hour course on a literary period, a 3-hour course on a genre, and a 3-hour course on a major author; 3 semester hours of American Literature; and 12 additional hours of courses offered by the Department of English of which at least 9 hours must be in English Literature.

Master of Arts in the field of American Literature.—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in English, or 24 semester hours in English and/or American literature above the sophomore level.

Required: the general requirements, page 90–97, including (1) 24 semester hours of course work planned in consultation with the adviser on the basis of the student's undergraduate preparation, including a minimum of 6 semester hours in

English literature; (2) a written Master's Comprehensive Examination; (3) a Master's thesis (6 semester hours) written on an approved topic under the direction of the instructor in whose field the major portion of the material falls, or, with the approval of the Department adviser, 12 additional semester hours in lieu of thesis.

Master of Arts in the field of English Literature.—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in English or American Literature, or 24 semester hours in English and/or American literature above the sophomore level.

Required: the general requirements, pages 90–97, including (1) 24 semester hours of course work, planned in consultation with the adviser; (2) a written Master's Comprehensive Examination; and (3) a Master's thesis (6 semester hours) written on an approved topic under the direction of the instructor in whose field the material falls, or, with the approval of the Department adviser, 12 additional semester hours in lieu of thesis.

Doctor of Philosophy in the field of American Literature.—Required: the general requirements, pages 90–94, 97–99; *high-level* proficiency in an appropriate foreign language; the passing of a General Examination in four of the six following fields, one of which must be English Literature: (1) Early American Literature—to 1815, (2) American Fiction, (3) American Poetry, (4) American Romanticism, (5) American Realism, (6) English Literature—one of the first seven fields listed below under "Doctor of Philosophy in the field of English Literature." Each student plans his program in consultation with a departmental committee.

Doctor of Philosophy in the field of English Literature.—Required: the general requirements, pages 90–94; 97–99; *high-level* proficiency in an appropriate foreign language; the passing of a General Examination in four of the eight following fields: (1) Beginnings to 1500, Linguistics, and History of the Language; (2) 1500–1660; (3) 1660–1800; (4) 1800–1900; (5) 1900 to Present; (6) Drama, including Shakespeare; (7) Criticism; (8) American Literature—one of the first five fields listed above under "Doctor of Philosophy in the field of American Literature." Each student plans his program in consultation with a departmental committee.

Bachelor of Arts in Education with a a teaching field in English.—Prerequisite: the Education curriculum, pages 76–77.

Required: the English option and the professional courses listed on pages 110, 117.

Students whose College Board English Composition Achievement Test scores suggest inadequate preparation may be assigned to Engl 9 or may be tested in vocabulary, spelling, grammar, standard usage, and writing skill, before placement in either Engl 9 or 10. Students whose scores and/or writing skill indicate superior competence will be allowed to waive Engl 10; those whose scores indicate markedly superior competence will be allowed to waive both Engl 10 and Engl 11 or 12.

For information on English Placement Test for foreign students, see page 26.

Departmental prerequisite: Engl 9 or 10 is prerequisite to all other courses in English. A 6-semester-hour course in literature, or equivalent, or written permission of the instructor, is prerequisite for admission to all second-group courses in English except Engl 115 and 161–62.

ENGLISH COMPOSITION

FIRST GROUP

3 English for Foreign Students (3) Bozzini

(Formerly Engl A)

Reading and writing to assist the foreign student in overcoming deficien-

cies in the use of English. Special attention to spelling, syntax, grammar, idiom, and vocabulary. (Fall and spring)

5 **English for Foreign Students** (3) Bozzini
(Formerly Engl B)
For second-semester foreign students not ready for Engl 10. Writing of expository paragraphs and themes; outlining; reading for comprehension, vocabulary, and style. (Fall and spring)

9 **English Composition: Language as Communication** (3) Moore and Staff
(Formerly Engl 1x)
Intensive course in English grammar and composition for students inadequately prepared for Engl 10. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 10. Engl 9 meets five hours a week and carries 3 semester hours of credit. Total fee, $295 (tuition of $270 plus additional fee of $25.) (Fall and spring)

10 **English Composition: Language as Communication** (3) Moore and Staff
(Formerly Engl 1)
Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure. (Fall and spring)

11 **English Composition: Language and the Arts and Sciences** (3) Moore and Staff
(Formerly Engl 2)
Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected readings on the nature of language and of the arts and sciences. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 11 cannot receive credit for Engl 12. (Fall and spring)

12 **English Composition: Language in Literature** (3) Moore and Staff
(Formerly Engl 4)
Study and practice of expository and argumentative techniques through critical writing; emphasis on the rhetorical complexities of stylistics in the sentence and in diction, and on logical thought, by the study of literary genres and of the use of language in literature. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 12 cannot receive credit for Engl 11. (Fall and spring)

SECOND GROUP

101 **Expository Writing** (3) McClanahan, Moore
Types of expository writing; weekly exercises based on students' needs; particular attention may be given to problems in the writing of graduate theses. Prerequisite: Engl 9 or 10; 11 or 12. (Fall)

102 **Narrative Writing** (3) Claeyssens
Techniques of narrative writing; class criticism of student writing. Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. To apply for the

instructor's consent a student should, before registration, submit samples of his writing. (Fall)

103 **The Writing of Fiction—the Short Story** (3) Claeyssens

Prerequisite: Engl 102, consent of instructor. To apply for the instructor's consent a student should, before registration, submit a sample of his writing. (Fall)

105–6 **The Writing of Plays** (3–3) Claeyssens

Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. To apply for the instructor's consent a student should, before registration, submit a sample of his writing.

107 **The Writing of Fiction—the Novel** (3) Claeyssens

Prerequisite: Engl 102 or 103; consent of instructor. To apply for the instructor's consent a student should, before registration, submit a sample of his writing. (Spring)

108 **Advanced Writing—Poetry and Prose** (3) Weismiller

Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. To apply for the instructor's consent a student should, before registration, submit a sample of his writing. (Spring)

ENGLISH LITERATURE

FIRST GROUP

51–52 **Introduction to English Literature** (3–3) Quitslund and Staff

Representative works by major authors studied in their historical context; discussion of recurrent themes, and introduction to various types and forms of imaginative literature. (Academic year)

91–92 **Introduction to European Literature** (3–3) Crane and Staff

Consideration of various types. (Academic year)

SECOND GROUP

111 **Medieval English Literature—Exclusive of Chaucer** (3) Allee

112 **Chaucer** (3) Allee

(Spring)

115 **Introduction to English Linguistics** (3) Allee

Development of the English language in a historical treatment of English grammar. (Fall)

116 **Medieval Legend and Saga** (3) Allee

Celtic and Norse.

117–18 **English Poetry: Form and Content** (3–3) Weismiller

Medieval period to the 20th century. (Engl 117—fall)

121 **Practical Criticism** (3) Weismiller

(Fall)

122 **History of English Literature** (3) Reesing
(Spring)

123 **Principles of Literary Criticism** (3)

125–26 **Elizabethan Verse and Prose** (3–3) Quitslund
Engl 125: major authors of lyric poetry, prose fiction, and criticism of the later 16th century. Engl 126: the poetry of Edmund Spenser in the context of other Renaissance poetry. (Academic year)

127–28 **Shakespeare** (3–3) Crane, Quitslund
(Academic year)

129 **The Earlier 17th Century** (3) Reesing
Poetry and prose to 1660, exclusive of Milton. (Fall)

130 **Milton** (3) Reesing
(Spring)

131–32 **English Literature, 1660–1780** (3–3) Highfill
Poetry and prose of the Neoclassic period. Engl 131: 1660–1740. Engl 132: 1740–1780.

133–34 **The Romantic Movement** (3–3) Combs
Engl 133: survey of poetry and prose, 1780–1830. Engl 134: detailed study of major writers and genres. (Academic year)

135–36 **Victorian Literature** (3–3) Staff
Engl 135: survey of poetry and prose, 1830–1900. Engl 136: detailed study of major writers and genres. (Academic year)

137–38 **The 20th Century** (3–3) Linton
Literature since 1900. Engl 137: poetry and criticism. Engl 138: drama and the novel. (Academic year)

145 **Special Topics in English Literature** (3) Staff

151 **19th Century British Poetry** (3) Staff
Readings in Wordsworth, Keats, Browning, and Swinburne.

153–54 **The English Novel** (3–3) Staff
Major novelists. Engl 153: 18th century. Engl 154: 19th century.

155–56 **The English Drama** (3–3) Crane
Engl 155: principally the drama of Shakespeare's contemporaries. Engl 156: historical survey, 1660 to present. (Academic year)

157 **20th Century Drama** (3)
Representative continental, English, and American plays of the 20th century.

158 **20th Century British Prose Fiction** (3)

159–60 **Senior Seminar in English Literature** (3–3) Reesing, Weismiller
Engl 159: Classicism in England—the course of the Renaissance tradition in English literature; readings from Sidney, Jonson, Milton, Dryden, Pope, and Johnson. Engl 160: fictions—from Myth to Anti-story; an

inquiry into the relationships between various kinds of imaginative narrative and what is thought of as "real life." (Academic year)

197 **Independent Study** (3) Weismiller and Staff

Open to honors candidates in the field-of-study major during their senior year. (Fall and spring)

198 **Senior Honors Thesis** (3) Weismiller and Staff

An independent-study course in which, under the guidance of an instructor, the student writes a thesis on an approved topic. Open to qualified seniors in the field-of-study major in English Literature. (Fall and spring)

THIRD GROUP

212 **Studies in Chaucer** (3) Allee

213 **Old English** (3) Allee

Old English grammar and readings. (Fall)

214 **Beowulf** (3) Allee

Prerequisite: Engl 213 or equivalent. (Spring)

217 **English Poetry: the Formal Development** (3) Weismiller

218 **Form and Content in Modern Poetry** (3) Weismiller

(Spring)

219 **Research Methods and Bibliographical Materials** (3) Broderick

To acquaint graduate students with the principal sources of bibliography and the typical problems in research. (Fall)

220 **Studies in Modern Dramatic Literature** (3) Crane

221 **Studies in Comic Literature** (3) Crane

223–24 **Studies in Literary Criticism** (3–3) Plotz

225–26 **Studies in 16th Century English Literature** (3–3) Quitslund

(Engl 225—spring)

227–28 **Studies in Shakespeare and His Contemporaries** (3–3) Crane, Highfill

(Academic year)

229 **Studies in English Literature, 1600–1660** (3) Reesing

Chief figures exclusive of Milton. (Fall)

230 **Studies in Milton** (3) Reesing

(Spring)

231–32 **Studies in English Literature, 1660–1780** (3–3) Highfill

233–34 **Studies in the Romantic Movement** (3–3) Plotz

235–36 **Studies in Victorian Literature** (3–3)

237–38 **Studies in 20th Century Literature** (3–3) Weismiller

The poetry of Hopkins, Hardy, Yeats, Pound, Eliot, Lawrence, Auden, and Dylan Thomas, with emphasis on Yeats and Lawrence. (Engl 237—fall)

253–54 **Seminar: the English Novel** (3–3)

255–56 **Studies in Dramatic and Theatrical History** (3–3) Highfill

Engl 256: seminar in drama and theatre of the Restoration and 18th Century, held among the Folger Library collections.

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

George Washington University is a member of the Folger Institute of Renaissance and 18th-century Studies. The policies of the Institute are set by a central committee on which each member institution is represented. Doctoral students enrolled in one of the Institute seminars are eligible to apply for fellowship aid, under a grant from the National Endowment for the Humanities. Folger Institute Seminars are numbered 301 through 309. Seminar titles for the 1974 fall semester (301, 305, 307, 309) are listed below. Seminar titles for the spring 1975 semester (302, 304, 306, 308) will be announced. Students wishing to register for these courses should consult the Chairman of the Department of English.

301 **Anglo-Dutch Relations** (3)

(Fall)

305 **"King Lear"** (3)

(Fall)

307 **The English Bible** (3)

(Fall)

309 **Paleography Workshop** (3)

(Fall)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

AMERICAN LITERATURE

FIRST GROUP

71–72 **Introduction to American Literature** (3–3) McCandlish and Staff

Historical survey. Engl 71: from beginnings to the Civil War. Engl 72: from the Civil War to present. (Academic year)

SECOND GROUP

161–62 **Studies in American Literature** (3–3) Sten

Same as AmCv 161–62. Major factors in the national cultural tradition as shown by outstanding writers. (Academic year)

163–64 **Major American Poets** (3–3) Ganz

Advanced critical study of significant writers and movements. Engl 163: from beginnings through the 19th century. Engl 164: the 20th century. (Academic year)

165–66 **American Drama** (3–3) Scanlan

Historical and critical study of significant plays and forms. Engl 165: from beginnings to 1930. Engl 166: since 1930. (Academic year)

167–68 **The American Novel** (3–3) Coberly and Staff

Historical and critical study of significant novels. Engl 167: from beginings through the 19th century. Engl 168: 20th century. (Academic year)

170 **The American Short Story** (3) Coberly

Historical development of the short story in America. (Fall)

171–72 **Major American Writers** (3–3) Combs, Ganz

(Engl 172: modern Southern writers—spring)

173–74 **Selected Literary Movements** (3–3) Ganz, Claeyssens

Engl 173: Romanticism in America, 1905-1925—new developments and continuities; William James, Santayana, Cather, Hemingway, Robinson, Frost, Stevens, Eliot, Pound, and Cummings. Engl 174: *The New Yorker*, 1925-1975, as arbiter of taste and as innovator; a study in literary influence.

175–76 **Special Topics in American Literature** (3–3)

177–78 **Contemporary American Literature** (3–3) Ganz, Claeyssens

(Academic year)

197 **Independent Study** (3) Weismiller and Staff

Open to honors candidates in the field-of-study major during their senior year. (Fall and spring)

198 **Senior Honors Thesis** (3) Weismiller and Staff

An independent-study course in which, under the guidance of an instructor, the student writes a thesis on an approved topic. Open to qualified seniors in the field-of-study major in American Literature. (Fall and spring)

199–200 **Proseminar in American Literature** (3–3) Scanlan and Staff

For field-of-study majors in American Literature. Readings, conferences, and group discussions. (Academic year)

THIRD GROUP

219 **Research Methods and Bibliographical Materials** (3) Broderick

To acquaint graduate students with the principal sources of bibliography and the typical problems in research. (Fall)

263–64 **Studies in American Poetry** (3–3) Ganz
(Academic year)

267–68 **Seminar: American Fiction** (3–3) Coberly
Research and critical reading: fiction and the criticism of fiction. (Engl 267—fall)

270 **Seminar: the American Short Story** (3)

281–82 **Seminar: Early American Literature** (3–3) McCandlish
Same as AmCv 281–82.

283–84 **Studies in American Romanticism** (3–3) Broderick
(Formerly Studies in American Transcendentalism)
Engl 284: Emerson, Thoreau, and the Concord Group; the intellectual background and the literary achievement. (Spring)

285–86 **Seminar: American Literature, 1865–1900** (3–3) McCandlish
Realism in America.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

367–68 **Readings in American Fiction** (3–3) Staff
For graduate students only. Literature and the critical materials for which graduate students are responsible on the Doctor of Philosophy general examination.

381–82 **Readings in Early American Literature** (3–3) McCandlish

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Environmental Studies

COMMITTEE ON ENVIRONMENTAL STUDIES

Henry Merchant (*Chairman*), Otto Bergmann, S.W. Burks, R.S. French, R.W. Kenny, R.C. Lindholm, T.P.G. Liverman, W.E. Schmidt

Columbian College of Arts and Sciences offers interdepartmental programs in Environmental Studies leading to the degree of Bachelor of Arts or Bachelor of Science. The program leading to the degree of Bachelor of Arts is designed for the student whose orientation is essentially political or social and who expects to enter law, politics, urban planning, or other areas for the purpose of

altering society's responses to environmental problems. The program leading to the degree of Bachelor of Science is designed for the student with well developed interests in science who seeks professional identification as a field or laboratory worker in the environmental sciences.

Bachelor of Arts with a major in Environmental Studies (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses (qualified students may substitute advanced courses with departmental permission, in order to include more elective courses in their program):
   (a) Mathematics and/or Statistics—9 semester hours selected from Math 31, 32, 51, 52, 111; Stat 91, 97, 113, 118, 198.
   (b) Natural Sciences—6 to 8 semester hours selected from B Sc 11–12; Chem 11–12; Geol 1–2; or Phys 1, 2.
   (c) Social Studies—12 semester hours selected from Anth 1–2; Econ 1–2; Geog 51, 52; P Sc 4 or 5, 6; Psyc 1, 5–6; or Soc 1, 2.
3. Required courses in the major (48 semester hours):
   (a) B Sc 140 (4 semester hours).
   (b) 8 semester hours selected from B Sc 111, 115, 118, 123, 124, 167 (Biology); B Sc 109, 110 (Botany); B Sc 101, 102, 143, 144 (Zoology); Chem 50, 151–52, 156; Geol 5, 125, 147, 163, 172, 181; Phys 6, 31, 32.
   (c) 30 semester hours in courses selected from *two* departments in the following—Anth 151, 152, 170; Econ 101, 102, 136, 157; Geog 127, 132, 133, 140, 142, 144; P Sc 103, 104, 108, 146; Psyc 151, 156; Soc 126, 127, 128.
   (d) Envr 151–52 (6 semester hours).

Bachelor of Science with a major in Environmental Studies (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses (qualified students may substitute advanced courses with departmental permission, in order to include more elective courses in their program):
   (a) Mathematics and/or Statistics—9 semester hours selected from Math 31, 32, 51, 52, 111; Stat 91, 97, 113, 118, 198.
   (b) Natural Sciences—12 to 16 semester hours selected from B Sc 11–12; Chem 11–12; Geol 1–2; Phys 1, 2. Either B Sc 11–12 or Chem 11–12 must be selected.
   (c) Social Studies—12 semester hours selected from Anth 1–2; Econ 1–2; Geog 51, 52; P Sc 4 or 5, 6; Psyc 1, 5–6; Soc 1, 2.
3. Required courses for the major (48 semester hours):
   (a) B Sc 140 (4 semester hours).
   (b) 20 semester hours selected from B Sc 111, 115, 118, 123, 124, 167 (Biology); B Sc 109, 110, 125 (Botany); B Sc 101, 102, 143, 144 (Zoology); Chem 50, 151–52, 153–54; Geol 5, 125, 147, 163, 172, 181; Phys 6, 31, 32.
   (c) 18 semester hours selected from Anth 151, 152, 170; Econ 101, 102, 136, 157; Geog 127, 132, 133, 140, 142, 144; P Sc 103, 104, 108, 146; Psyc 151, 156, Soc 126, 127, 128.
   (d) Envr 151–52 (6 semester hours).

The science and social studies courses listed under 3(b) and 3(c) above must be taken in not more than *three* departments.

In choosing elective courses for both the Bachelor of Arts and Bachelor of Science degree programs, students are reminded that permission of the Dean of Columbian College of Arts and Sciences and the Committee on Environmental Studies is necessary to take courses not offered by Columbian College of Arts and Sciences, and that a maximum of 12 semester hours of such courses may be taken

The following may be of interest to the Environmental Studies major: B Ad 101, 171, 172, 173, 174, 201, 203; *CE 194, 197; PE 152; U&RP 153, 201, 205. The permission of the instructor, the department chairman, and the Dean of the School of Government and Business Administration is necessary to take graduate courses (numbered 201 and above) in that School.

SECOND GROUP

151–52 **Senior Seminar in Environmental Studies** (3–3) Staff

Limited to majors in Environmental Studies. Directed reading and discussion of contemporary environmental problems.

Epidemiology and Environmental Health

Professor J.W. Millar (*Chairman*)
Professorial Lecturer J.E. Banta
Associate Professors C.R. Hartman, E.N. Kassira, Yousef Al-Doory
Associate Clinical Professors W.J. Zukel, L.S. Jaffe
Associate Professorial Lecturers C.E. Alexander, Jr., H.A. Bradford
Assistant Clinical Professors Lawrence Pyle, Jr., John Vinyard, Jr.
Assistant Professorial Lecturers N.E. Manos, J.A. Lee, Olga Joly, D.V. Lassiter, Elizabeth Force, F.L. Hurley (*Biostatistics*), Arlene Fonaroff, J.T. Dalton
Clinical Instructor J.S. Sullivan
Special Lecturers W.R. Chiarulli, M.K. Howell, Jr.

Bachelor of Science in Environmental Health.—This degree program is offered by the School of Medicine and Health Sciences. Interested students should consult the *School of Medicine and Health Sciences* catalogue.

Master of Science in the field of Mycology.—An interdepartmental degree offered by the departments of Biochemistry, Epidemiology and Environmental Health, and Microbiology.

Prerequisite: a Bachelor's degree with a major in Biology, Botany, Chemistry, or Zoology from this University, or an equivalent degree. The undergraduate program should have included the following courses, or equivalent: B Sc 11–12; Chem 11–12, 151–52, 153–54.

Required: the general requirements, pages 90–97. Candidates must complete either (1) a minimum of 30 semester hours including Bioc 221; Epid 201, 217 (4 semester hours), 230 (2 semester hours), 299–300; Micr 211, 212, 231, 251, 255; or (2) a minimum of 36 semester hours without a thesis including Bioc 221–22; Epid 201, 217 (4 semester hours), 218 (2 semester hours), 230 (2 semester hours); Micr 211, 212, 225, 231, 251, 255.

Doctor of Philosophy field of study in Human Ecology.—See pages 90–94, 97–99, for requirements for the degree.

201 **Introduction to Epidemiology and Environmental Health** (2) Millar and Staff

Required for medical students; open to qualified graduate students. Principles and methodology of epidemiology and biostatistics. Ecological

* See the *School of Engineering and Applied Science* catalogue for CE (Civil Engineering) courses.

approach to health and disease, including parasitology and mycology. (Spring)

217 Clinical Mycology (2 or 4) — Al-Doory

Study of clinical aspects of mycotic diseases; emphasis on diagnosis of disease and identification of etiologic agents. (Fall)

218 Medical Parasitology (1 or 2) — Millar and Staff

For medical students; open to qualified graduate students. Study of host-parasite relationships. Clinical recognition of the important parasites in medicine. (Fall)

219 Malariology (1) — Kassira and Staff

The general principles of the diagnosis, life cycle, pathogenicity, treatment, and prevention of malaria. Prerequisite: Epid 201 or equivalent. (Fall)

230 Biostatistics (2 or 4) — Staff

Introduction to statistical analysis, theory of measurements and distribution, including significance testing, basic concepts of probability and association, sampling techniques, design of experiments, and introduction to computers. (Fall and spring)

241 Digital Computer Programming with Health Sciences Applications (3) — Staff

Use of digital computers in medicine, related health sciences, and other computational work. Writing, debugging, and running programs on the digital computer. (Fall and spring)

295 Research in Epidemiology (arr.) — Staff

Participation in experimental studies in infectious diseases and research in community medicine. Admission by permission of Department. (Fall and spring)

299–300 Thesis Research (3–3) — Staff

(Fall and spring)

301 Applied Epidemiology (3) — Staff

Lectures, seminars, and case studies. Epidemiological solutions to health problems of the community. (Fall and spring)

351 Global Epidemiology (1) — Staff

For medical students; open to graduate students by arrangement. Geographic pathology of disease and international aspects of disease prevention and control, including world demographic problems. (Fall)

352 Seminar: Experimental Epidemiology (2) — Hurley

For medical students; open to graduate students by arrangement. Student participation in definitions, design, and methods for developing epidemiologic studies of diseases. Prerequisite: Epid 230 or permission of instructor. (Fall)

353 Military Preventive Medicine (1) — Staff

Operational medicine, environmental and sanitation problems, epidemiologic diseases of military importance and their prevention and control. Medical aspects of aerospace and submarine medicine. (Fall)

354 **Seminar: Human Ecology** (1) — Lee and Staff

Ecology—man within the framework of reference—physical and cultural anthropology, geography, sociology, urban planning, public health, and public administration. (Fall)

356 **Introduction to Environmental Health** (3) — Jaffe, Millar

A survey of organization, function, current practices, and federal, state, and local regulations to control the environment. (Spring)

398 **Advanced Reading and Research** (arr.) — Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) — Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Experimental Humanities*

Professor C.C. Mondale
Associate Professor R.S. French

EXPERIMENTAL HUMANITIES

FIRST GROUP

4 **Contemporary Political Imagination** (3)

A freshman course; limited enrollment. Students will be housed in Thurston Hall. Field-study and case-study of value conflicts implicit in selected political issues involving federal policy and legislation. Concurrent registration in a special section of P Sc 4 required. Students registering for Hum 4 in the fall semester will be required to register for Hum 6 in the spring semester. Admission by permission of instructor. (Fall)

6 **Contemporary Political Imagination** (3)

Continuation of Hum 4. Concurent registration in a special section of P Sc 6 required. Prerequisite: Hum 4. (Spring)

†26 **Environmental Issues** (3) — French, Langran, Schiff

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Fall and spring)

37 **Computer Technology and Social Issues: the Search for New Alternatives** (3) — Mondale and Interdisciplinary Team

An all-university course designed primarily for freshmen. Student team-study of selected social issues related to developing computer technology.

* Administered by the Division of Experimental Programs.
† Offered jointly by the Division of Experimental Programs and the departments of Biological Sciences and Geography and Regional Science.

Introduction to computer systems and to applications and long-range implications of the new technology. (Fall)

40 **Washington, D.C., Culture and Politics** (3) French and Interdisciplinary Team

An all-university course designed primarily for freshmen and transfer students. Major facets of metropolitan life, past and present, analyzed by faculty, students, and community leaders. (Fall)

42 **The United States and Japan** (3) Poole and Interdisciplinary Team

Interdisciplinary and issue-oriented examination of the cultural and political consequences to Americans of the emergence of Japan as a postwar power. Special effort is made to incorporate field resources in the Washington, D.C. area for class presentations and student research. (Spring)

51–52 **The Individual and the City** (3–3) Wallace

Sophomore-level course. Hum 51: impact of urbanization on individuality as revealed in the arts and literature, and as analyzed in scientific studies of culture and personality. Hum 52: individual and/or group study of agencies of change, with special reference to Washington, D.C., area. Admission by permission of instructor. (Academic year)

SECOND GROUP

101–2 **Supervised Field-Study** (6–6) French

Community-based projects supervised by appropriate faculty. Juniors and seniors admitted by permission of instructor. Prerequisite to Hum 102: Hum 101. (Hum 101 and 102—fall and spring)

160 **Aesthetics of Cinema** (3) Claeyssens, Pfuntner

Better "seeing," rather than an accumulation of knowledge about the history of cinema. Development of disciplined, informed viewing of cinema, comparable to the cultivated reading of novels and poetry.

181 **Oral History Institute** (3) Staff

Introduction to the theory and practice of obtaining and using historical data through recorded interviews. Examination of major published works in oral history. Particular attention to ongoing oral history projects in the Washington area.

182 **Ethics and Economic Policy: Justice and Equality** (3) Griffith

Problems of social choice in economics combining philosophical insights from ethical theories; descriptive and theoretical insights from economics. Study of the justice of present mechanisms of distribution of income and wealth in the United States conducted with the assistance of economists within and outside the University.

196 **Urban Ecology Workshop** (3)

Legal, scientific, political, and ethical aspects of specific environmental issues in the Washington, D.C., metropolitan area.

197 **Workshop on the Politics of the Information Process** (3) Staff

Examination of the process by which Congressional committees acquire and dispense information. Selected study and research on issues of contemporary concern.

198 **Conference on Policy Studies and the Humanities** (3 or 6) Mondale and Interdisciplinary Team

Examination of specific contemporary policy issues in relation to alternative social goals. A new policy issue will be selected each year. Open only to graduate, law, and medical students, and undergraduate seniors by permission of instructor. (Spring)

SERVICE–LEARNING EXPERIMENTAL HUMANITIES

SECOND GROUP

150 **Learning through Service** (3 to 15) Mondale and Staff

Open only to juniors and seniors. Students undertake an assignment with an off-campus agency or group. Arrangements are made through a "contractual" agreement among the student, the agency or group, and the Service-Learning Program, with the amount of credit depending upon the nature of the assignment. (Fall and spring)

Forensic Sciences

Professors T.P. Perros, A.H. Desmond, R.C. Allen (*Chairman*), J.E. Starrs, T.F. Courtless, Jr.
Professorial Lecturers A.H. Kaplan, K.M. Earle, I.W. Conrad, Briggs White, R.C. Froede, C.J. Stahl III, J.G. Zimmerly
Adjunct Associate Professor C.G. McWright
Associate Professorial Lecturers F.B. Johnson, I.M. Sopher, M.G. Dixon, T.F. Kelleher, Jr., L.R. Goldbaum, H.M. Silverberg
Assistant Professor E.H. Williams
Assistant Professorial Lecturers R.C. Boyers, J.D. Ellis, Jr., C.L. Killion

Master of Forensic Sciences.—Prerequisite: a Bachelor's or a graduate degree from an accredited institution of higher learning and academic or professional training in the behavioral, biological, or physical sciences; law; or medicine.

Required: the general requirements pages 90–97. The program of study consists of 36 semester hours of graduate-level courses, or, if a thesis is required, the program consists of 30 semester hours of graduate-level courses plus a thesis (equivalent to 6 semester hours). The program of study must include ForS 220 if the student does not have a background in the forensic physical sciences, and ForS 224 if the student has no prior academic training in law. In addition, the student is required to select the following course work: (1) at least 9 semester hours in the forensic physical sciences selected from ForS 201, 202, 203, or 204; (2) at least 6 hours in forensic medicine selected from ForS 214, 260, 261, 262, 263, 264, 266, 267, or 269; (3) at least 6 hours in law and the administration of justice selected from ForS 225, 227, 228, 229, 231, or 232; (4) the remaining semester hours must be selected from the behavioral, biological, or physical sciences; the forensic sciences, management science, law, or the basic medical sciences. All candidates are required to pass a written Master's Comprehensive Examination. There is no tool requirement.

Master of Science in Forensic Science.—Prerequisite: a Bachelor's or a graduate degree from an accredited institution of higher learning and academic or professional training in the biological or physical sciences.

Required: the general requirements pages 90–97. The program of study consists of 36 semester hours of graduate-level courses, or, if a thesis is required, the program consists of 30 semester hours of graduate-level courses plus a thesis (equivalent to 6 semester hours). The program of study must include (1) ForS 201, 202, 203, 204, 220, 224, and 261; (2) at least 6 semester hours in law and administration of justice selected from ForS 225, 227, 228, 229, 231, or 232; (3) the remaining semester hours must be selected from approved courses selected from the biological and physical sciences, forensic sciences, management science, or law. All candidates are required to pass a written Master's Comprehensive Examination. There is no tool requirement.

The interdisciplinary programs leading to the degrees of Master of Forensic Sciences and Master of Science in Forensic Science may include course work from the School of Government and Business Administration, from the National Law Center, and from the behavioral, biological, and physical science departments of the Graduate School of Arts and Sciences. Students work closely with their advisers in setting up a program that meets their interests, needs, and background knowledge. The Department of Forensic Sciences is affiliated with the Armed Forces Institute of Pathology in a program of mutual exchange among students, courses, and facilities. For further information, contact the Department of Forensic Sciences.

THIRD GROUP

201 **Serology, Microscopy, Mineralogy** (3) — Desmond

Principles of forensic serology; microscopic and optical analyses of human and animal reproductive cells, hairs, natural and synthetic fibers, and materials of a mineral nature. (Fall)

202 **Instrumental Analysis** (3) — Perros

Principles and application of various instrumental methods to the examination of criminal evidence, including chromatographic and spectrophometric techniques and mass spectrometry. (Spring)

203 **Examination of Questioned Documents** (3) — Williams

Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture and fiber analysis; studies of paper and methods of examination of questioned documents. (Fall)

204 **Firearms and Tool-mark Identification** (3) — Staff

Study of methods for identifying firearms, cartridge casings, tool-marks, tire marks, and footprints. (Spring)

*214 **Forensic Psychiatry** (3) — Allen

Introduction to the constructs of dynamic psychiatry, psychiatric treatment and the nomenclature of mental disorders. Consideration of expert testimony, direct examination and cross-examination in hospitalization and criminal cases. (Spring)

220 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (3) — Starrs, Williams

(Formerly ForS 205 Survey of Forensic Science (3) and ForS 226 The Crime Lab, the Forensic Scientist, and the Criminal Lawyer (3))

Survey of the forensic physical sciences; qualifications and preparation of

* May also be taken through the National Law Center, with permission of the Dean of the National Law Center and of the instructor.

the expert witness, and his role in court in criminal and civil cases; operation and functioning of the crime lab. (Fall and spring)

224 **Introduction to Criminal Law, Procedure, Evidence, and Legal Methods** (3) Starrs

Principles of criminal law and procedure, preparation and presentation of evidence, examination of witnesses, and the methods of legal research. (Fall and spring)

225 **Advanced Criminal Evidence** (3) Starrs

Study of procedural rules affecting the collection and use of physical evidence, with emphasis on court opinions defining the rules of search and seizure and admissibility of evidence. Prerequisite: ForS 224 or equivalent experience. (Spring)

*227 **Advanced Criminal Procedure** (3) Starrs

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Prerequisite: ForS 224 or equivalent experience. (Fall)

*228 **Administration of Criminal Justice** (3) Allen, Zimmerly

Consideration and analysis of selected advanced problems in the administration of criminal justice. Emphasis on the role and professional responsibilities of prosecutor and defense counsel and on developmental trends in the law. Prerequisite: ForS 224 or equivalent experience. (Fall)

*229 **The Police and the Community** (3) Allen, Courtless

Problems and potential of contemporary urban law enforcement; the role and perspective of the police officer. (Spring)

*231 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3) Courtless

Role which knowledge of crime causation may play in assessing devices to control deviant behavior; factors related to criminal behavior; current causal theories. (Fall)

*232 **Law and Criminology II: Society's Responses to the Criminal Offender** (3) Courtless

Study of punitive, mechanical, and correctional approaches to offenders. Emphasis on changing responses to criminal and delinquent behavior, and research on effectiveness. (Spring)

*241 **Food and Drug Law** (3) Kaplan

The Federal Food, Drug, and Cosmetic Act, and related laws. Consumer, government, and industry viewpoints. (Fall)

254 **Seminar: Selected Topics in the Forensic Sciences** (3) Staff

(Formerly Seminar: Recent Developments in Forensic Science (2))

Exploration of selected current issues in research, investigation, and law.

260 **Introduction to Human Physiology and Pathology** (3) Froede

Introduction to physiology and pathology of the human body; emphasis

* May also be taken through the National Law Center, with permission of the Dean of the National Law Center.

on medical terminology. Basic understanding of the body functions in health and disease. (Fall)

261 **Introduction to Forensic Pathology** (3) Stahl

Terminology and scientific techniques used in medicolegal investigations, sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma. (Fall)

262 **Current Trends in Forensic Pathology and Forensic Odontology** (3) Ellis

Emphasis on (1) the relationship among law, medicine, and law enforcement; and (2) the advancement of forensic knowledge. (Fall)

263 **Seminar: Law, Medicine, and Forensic Sciences** (3) Dixon

Emphasis on the introduction of forensic science data/evidence in civil and criminal cases. (Spring)

264 **Medical Jurisprudence** (3) Zimmerly

Legal problems inherent in the practice of medicine. Laws regulating health personnel and health industry. Emphasis on professional liability.

266 **Forensic Neuropathology** (3) Earle

Fundamentals of neuropathology of natural disease and traumatic injuries of the nervous system, including demonstrations of gross pathologic specimens. (Spring)

267 **Applications of Histochemistry to the Forensic Sciences** (3) Johnson

Chemical and physical methods for the localization, identification, and characterization of materials under the microscope, including carbohydrates, enzymes, lipids, minerals, pigments, and proteins. (Spring)

268 **Photography in the Forensic Sciences** (3) Staff

Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. Laboratory fee, $25.

269 **Principles of Forensic Toxicology** (3) Goldbaum

Analytical procedures used for the detection of drugs, poisons, and toxic agents in biological specimens. Admission by permission of instructor. (Spring)

295 **Research** (arr.) Staff

Open to qualified Master's degree students. Research on problems approved by the Chairman of the Department or academic adviser, under the supervision of an appropriate staff member. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

French

See "Romance Languages and Literatures."

Genetics—Graduate Study

COMMITTEE ON GENETICS

S.O. Schiff (*Chairman*), W.F. Anderson, Rosalie De Giovanni-Donnelly, G.S. Edwards, W.G. Flamm, T.B. Friedman, R.C. Gallo, J.C. Houck, C.B. Jacobson, Kenneth Krell, W.M. Leach, C.D. Lytle, C.R. Merril, John Minna, W.G. Nash, J.C. Petricciani, Jeffrey Schlom, Sandra Smith-Gill

The Graduate School of Arts and Sciences offers an interdepartmental program leading to the degrees of Master of Science and Doctor of Philosophy in the field of Genetics. This program is directed by a Committee whose members are drawn from the departments of Biochemistry, Biological Sciences, Child Health and Development, Microbiology, Obstetrics and Gynecology, and Pharmacology; and from three government agencies—the Bureau of Radiological Health, the National Institutes of Health, and the National Institute of Mental Health.

A baccalaureate degree is required for admission to the degree program. The undergraduate program must have included the following: 8 semester hours each in biology, inorganic chemistry, and organic chemistry; 6 to 8 semester hours in physics; and 6 semester hours of English composition and literature. While not required for admission, courses in embryology, histology, genetics, and mathematics are strongly recommended.

Master of Science in the field of Genetics.—Required: the general requirements, pages 90–97. The 30 semester hours required in this program must include Gnet 201–2 and Gnet 299–300. The remaining 20 semester hours of course work are to be selected, with the approval of the Committee on Genetics, from the departmental courses listed below.

Doctor of Philosophy in the field of Genetics.—Required: the general requirements, pages 90–94, 97–99. The program of study must include Gnet 301–2, 8 to 10 semester hours of biochemistry, 6 to 8 semester hours of cell biology, 10 to 12 semester hours of genetics, and 2 or 3 semester hours of statistics. These courses may be selected from the departmental listings on pages 302–3.

GENETICS

THIRD GROUP

201–2 **Advanced Problems in Genetics** (2–2) Staff

Individual study with each member of the Committee on Genetics. Required of all Master's degree candidates in the field of Genetics. (Academic year)

225 **Genetic Aspects of Development** (2) Friedman

Aspects of genetic control and biochemistry of development in a variety of organisms. Prerequisite: a basic genetics course. (Spring)

295 **Research** (arr.) Staff

Open to qualified Master's degree students. Research on problems approved by the Committee on Genetics. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Academic year)

FOURTH GROUP

301–2 **Advanced Problems in Genetics** (2–2) Staff
Individual study with each member of the Committee on Genetics. Required of all students preparing for the Doctor of Philosophy general examination whose field of study is Genetics. (Academic year)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ANATOMY

203 *Human Embryology* (1)
256 *Human Genetics* (1)
260 *Electron Microscopy in Cellular Biology—Lecture* (1)
261 *Electron Microscopy in Cellular Biology—Laboratory* (2)

BIOCHEMISTRY

221–22 *General Biochemistry* (4–5)
224 *Biochemistry of Enzymes* (1)
227 *Biochemistry Seminar* (1)
258 *Inherited Metabolic Diseases* (1)
266 *Biochemical Genetics* (1)

BIOLOGICAL SCIENCES

BIOLOGY

108 *Organic Evolution* (3)
115 *Cytology* (4)
118 *Advanced Cytology* (3)
123 *Cell Biochemistry* (3)
124 *Cell Biochemistry Laboratory* (1)
127 *Genetics* (4)
138 *Advanced Genetics* (3)
167 *Radiation Biology* (3)
206 *Seminar: Radiation Biology* (3)
207 *Seminar: Origin of Life* (3)
227 *Seminar: Genetics* (3)
248 *Analysis of Development* (3)
249 *Seminar: Developmental Biology* (3)

ZOOLOGY

145 *Introduction to Vertebrate Embryology* (4)
146 *Experimental Developmental Biology* (4)

EPIDEMIOLOGY AND ENVIRONMENTAL HEALTH

230 *Biostatistics* (2 or 4)

MICROBIOLOGY

258 *Microbial Genetics* (2)

OBSTETRICS AND GYNECOLOGY*

391 *Cytogenetics* (1)
392 *Reproductive Genetics* (1)
395 *Gametogenesis* (1)
399 *Medical Genetics* (1)

PHARMACOLOGY

256 *Molecular Pharmacology* (2)
258 *Cancer Chemotherapy* (1)

PHYSIOLOGY

201 *Physiology* (8)

STATISTICS

91 *Principles of Statistical Methods* (3)
117 *Analysis of Variance* (3)
253–54 *Mathematical Models in Population Genetics* (3–3)

Geography and Regional Science

Professor Marvin Gordon (*Chairman*)
Professorial Lecturer J.W. Nystrom
Associate Professor J.C. Lowe
Assistant Professors E.O. Pederson, K.J. Langran
Assistant Professorial Lecturer D.E. Starsinic

Bachelor of Arts with a major in Geography (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Required courses in the major—24 semester hours of second-group Geography and Regional Science courses, to be chosen in consultation with a departmental adviser.

Master of Arts in the field of Geography.—Prerequisite: a Bachelor of Arts degree with a major in Geography from this University, or an equivalent degree.

Required: the general requirements, pages 90–97. The minimum requirement consists of 30 semester hours of approved course work including a thesis; with the approval of the Department, a student may elect a program of study without a thesis. A Master's Comprehensive Examination in three fields is required. Candidates must fulfill the tool requirement by either passing a reading knowledge

* See the *School of Medicine and Health Sciences* catalogue.

examination in one foreign language or satisfactorily completing the tool requirement in Statistics.

Bachelor of Arts in Education with a teaching field in Geography.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Geography option and the professional courses listed on pages 111–12, 117.

Master of Arts in Education with a field in Elementary or *Secondary Education (specializing in Geography).*—Prerequisite: a Bachelor's degree with sufficient concentration in Geography to permit successful pursuit of graduate study in the Department of Geography and Regional Science. Candidates must be accepted by both the School of Education and the Department of Geography and Regional Science.

Required: the general requirements, pages 123–24, including 15 semester hours of graduate courses in Geography and Regional Science.

FIRST GROUP

*26 **Environmental Issues** (3) Langran, Schiff

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Fall and spring)

51 **Introduction to Geography** (3) Staff

General survey of the systematic fields of human geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts. (Fall and spring)

52 **Introduction to Economic Geography** (3) Pederson

Examination of the basic principles which determine the location of economic activities on the surface of the earth. (Spring)

SECOND GROUP

103 **Cartography and Graphics** (3) Staff

Principles of cartography; emphasis on design and presentation of spatial data. Map projections, field surveying, use of air photographs, map interpretation. Laboratory fee, $15. (Fall)

104 **Special Techniques in Cartography** (3) Staff

Descriptive and statistical techniques applied to thematic mapping. Laboratory fee, $15. (Spring)

125 **Transportation Geography** (3) Lowe

Consideration of the spatial aspects of interaction, diffusion, and information transfer, including nodal activity and hierarchies, network geometry, gravity models, and diffusion processes. (Spring)

126 **Economic Geography** (3) Pederson

Theories concerning the location of economic activities. Exercises in computer-oriented locational analysis. Prerequisite: Permission of instructor.

127 **Population and Settlement** (3) Starsinic

Patterns of world population; factors contributing to population pressures, growth, and migrations. (Spring)

* Offered jointly by the Division of Experimental Programs and the departments of Biological Sciences and Geography and Regional Science.

132 **Resource Management and Conservation** (3) Langran
(Formerly Resources and Environment)
Principles and practices in effective utilization of resources in the United States and selected areas; public policies relating to conservation; environmental systems, perception, and impact studies. (Fall)

133 **Geography of Poverty and Hunger** (3) Staff
Consideration of the locational aspects and correlates of poverty and hunger; rural and urban poverty regions; regional food budgets and taboos; programs concerned with the elimination of poverty and hunger. (Spring)

135 **Resources and Environmental Quality** (3) Langran
Analysis of the spatial pattern of resources; emphasis on the problems of international river basin and ocean resource management. (Spring)

139 **Geographic Perspectives on Current World Problems** (3) Staff
Consideration of the impact of contemporary changes in national resource and populational bases on political communities.

140 **Urban Geography** (3) Pederson
Analysis of the internal spatial structure of cities; emphasis on explaining patterns of location within the city. (Fall)

141 **Urban Settlement** (3) Pederson
Distribution of urbanization on the surface of the earth; processes which lead to urbanization; theories which can be used to analyze the location of cities. (Spring)

142 **Urban Environments and Systems** (3) Lowe
Consideration of the interrelationships among (1) urban physical environments, (2) urban service systems, (3) urban social environments, and (4) behavioral aspects of urban life. (Fall)

144 **Environmental Adaptation** (3) Lowe
Consideration of the man-environment relationship; emphasis on bioclimatological responses, disease ecology, nutritional demands, land capabilities, artificial environments, and environmental perception. (Spring)

145 **Cultural Geography** (3) Staff
Analysis of the relationships between culture and environment; emphasis on spatial and ecological considerations. (Fall)

146 **Political Geography** (3) Staff
Analysis of the interrelationships between the political community and the human and physical environment. (Fall and spring)

151 **United States and Canada** (3) Pederson
Examination of the emergence of land use and settlement patterns in the United States and Canada; emphasis on the regional variations within and between the two nations. (Spring)

155 **Africa** (3) Staff
Survey of the cultural and physical regional patterns of Africa.

161 **Latin America** (3) Gordon

Examination of spatial characteristics of physical and cultural phenomena in Middle and South America. (Fall)

164 **Geography of China** (3) Gordon

Survey of the cultural and physical regional patterns of China. (Spring)

189–90 **Readings in Geography** (arr.) Staff

(Academic year)

THIRD GROUP

205 **Introduction to Regional Science** (3) Staff

Introduction to recent developments in spatial analysis, including the fitting of probability functions to areal data; multivariate analysis; models optimality of numerical methods of regional delimitation.

*215 **Field Methods in Cultural Ecology: Pre-Columbian Settlement Patterns in the Tehuacan Valley** (6) Humphrey, Langran

Field and laboratory examination of settlement patterns and sociological structures in pre-Columbian Mesoamerica and their relationships to agricultural water-control systems.

221 **Seminar: Cultural Geography** (3) Langran

Study of the noneconomic processes which affect the location of human activity. Topics to be discussed are environmental perception and evaluation, social definitions of space, and diffusion of innovations. (Spring)

223 **Seminar: Population and Resources** (3) Langran, Gordon

Analysis of the spatial variations and interrelationships of population and resources. (Spring)

224 **Seminar: Political Geography** (3) Pederson

Study of the spatial relationships between the political community and environment.

225 **Seminar: Transportation Geography** (3) Lowe

Analysis of human spatial interaction; emphasis on networks, graph theory, gravity, interaction and potential models, migration models and diffusion processes. (Fall)

243 **Seminar: Urban Geography** (3) Lowe

Functional processes affecting the evolving morphology and internal spatial patterns of urban phenomena; emphasis on economic factors, behavioral considerations, and impact of time.

244 **Seminar: Urban Systems** (3) Pederson

Analysis of the basic concepts of urban hinterland, urban hierarchies, and functional typologies with a view to evaluating the significance of central place theory. (Fall)

* An interdepartmental course offered by the departments of Geography and Regional Science and Anthropology.

261 **Seminar: Geography of Latin America** (3) Gordon
Analysis of man-land relationships in Latin America. (Spring)

265 **Seminar: Geography of the Soviet Union** (3) Baclawski
Physical features, economic geography, natural and energy resources, industries, transportation, agriculture, population trends; emphasis on population patterns along borderlands, especially Sino-Soviet border. (Spring)

266 **Seminar: Geography of China** (3) True
Physical and economic geography; emerging industries, energy resources, transportation system. Emphasis on population distribution and growth; regional geography of selected areas. (Fall)

287 **Seminar: Problems in Latin American Civilization** (3) Staff
Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

295 **Research** (arr.) Staff
May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Geology

Professors Geza Teleki (*Chairman*), G.V. Carroll, F.R. Siegel, A.G. Coates
Adjunct Professors J.W. Pierce, E.G. Kauffman, I.G. Sohn
Professorial Lecturers Nicholas Hotton, Daniel Appleman, P.M. Kier, H.T. Evans, Jr., Isidore Zietz
Associate Professors R.C. Lindholm, J.F. Lewis
Associate Professorial Lecturers W.E. Maloney, M.A. Buzas, J.E. Hazel, Alfonso Geiger, M.D. Turner
Assistant Professorial Lecturers F.J. Collier, T.L. Hughes, E.T. Miller

Bachelor of Arts or *Bachelor of Science with a major in Geology (Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite course—Geol 21-22.
3. Required courses in related areas—(a) Chem 11–12; (b) Math 30 (for the degree of Bachelor of Arts) or Math 30 and 31 (for the degree of Bachelor of Science); (c) Stat 91; and (d) B Sc 11–12 or Phys 3 and 4 (for the degree of Bachelor of Arts) or B Sc 11–12, *and* Phys 1 or 3 (for the degree of Bachelor of Science).
4. Required courses in the major—Geol 111–12, 117, 118, 122, 151–52 for both the degree of Bachelor of Arts and Bachelor of Science; Geol 172, 189, 195 for the Bachelor of Science degree only.

Master of Arts or *Master of Science in the field of Geology.*—Prerequisite: the degree of Bachelor of Arts or Bachelor of Science, respectively, with a major in Geology from this University, or an equivalent degree.

Required: the general requirements, pages 90–97. Master of Science degree candidates must include in their program of study Geol 141, 163, 205, 266, and Math 31. Geol 299–300 *Thesis Research* is required for both degrees. Candidates must pass a Master's Comprehensive Examination before submitting their thesis work. A reading knowledge examination in French, German, Russian, or Spanish (with permission of Department), must be passed before beginning the thesis work or before beginning the third semester of graduate work. With the permission of the Department, candidates in the Master of Science program may substitute another approved tool subject in lieu of the foreign language requirement.

Master of Science in the field of Geochemistry (an interdepartmental degree offered by the departments of Geology and Chemistry).—Prerequisite: a Bachelor's degree with a major in Geology or in Chemistry from this University, or an equivalent degree.

Required: the general requirements, pages 90–97, including Chem 111–12; Geol 141, 241, 249; Geol 246 or Chem 213; and Geol 299–300. The Master's Comprehensive Examination must be taken before registration for the second half of the thesis work. A reading knowledge examination in a foreign language, approved by the Department of Geology or Chemistry, must be passed prior to beginning the third semester of graduate work or before beginning the thesis work, whichever occurs first.

Doctor of Philosophy in the field of Geology.—Required: the general requirements, pages 90–94, 97–99, including passing a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 91; and the satisfactory completion of the General Examination in three fields, one of which must be in Petrology, Stratigraphy, or Structural Geology.

Research fields: Geomorphology, Mineralogy, Paleontology, Petrology, Sedimentology, Stratigraphy, and Structural Geology.

Doctor of Philosophy in the field of Geochemistry (an interdepartmental field offered by the departments of Geology and Chemistry).—Required: the general requirements, pages 90–94, 97–99, including passing a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 117 and 118, or 91; and the satisfactory completion of the General Examination in four fields, including geochemistry and chemistry.

Bachelor of Arts in Education with a teaching field in Earth Science.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Earth Science option and the professional courses listed on pages 109, 117.

FIRST GROUP

1–2 Introductory Geology for Nonscience Majors (3–3) Staff

Lecture (2 hours), laboratory (2 hours). Survey covering the principles of geology; emphasis on man's effect on the environment. Laboratory fee, $12 a semester. (Academic year)

5 Environmental Geology (3) Siegel, Teleki

The relation of man and society to natural environment; population evolution and resources; economic, legal, and political aspects. (Fall and spring)

14 Field Petrology (3) Carroll

Lecture (2 hours), laboratory and field (3 hours). Field study of rocks. Laboratory fee, $12. (Fall)

21–22 Physical and Evolutionary Geology (3–3) Lindholm, Coates

Lecture and laboratory (5 hours). Principles of geology as a base for

further study in geology and related sciences. Laboratory fee, $12 a semester. (Geol 21—spring; Geol 22—fall)

SECOND GROUP

101 **History of Geological Sciences** (3) Teleki

Development of scientific thought; history of geological and related sciences. (Fall)

111–12 **Mineralogy** (4–3) Carroll

Lectures and laboratory. Geol 111: morphological and optical crystallography. Geol 112: paragenetic and systematic mineralogy. Admission by permission of instructor. Laboratory fee, $12 a semester. (Academic year)

113 **Crystallography** (3) Appleman

Point-group and space-group theory, fundamentals of crystal structure, X-ray diffraction theory and application. Prerequisite: Math 31. Laboratory fee, $15. (Fall or spring)

117 **Petrology** (2) Lewis

Introduction to silicate phase systems; physics and chemistry of crustal and magmatic processes; volcanic processes and products. Prerequisite: Geol 21, 111–12; Phys 1 or equivalent; or permission of instructor. (Spring)

118 **Petrology Laboratory** (2) Lewis

Concurrent registration in Geol 117 required for Geology majors. Prerequisite: Geol 111. Laboratory fee, $12. (Spring)

122 **Structural Geology** (4) Carroll

Lectures and field trips. Interpretation of geologic formations on basis of their structures; emphasis on applications to geologic field work. Prerequisite: Geol 22, or Geol 2 and 14. Laboratory fee, $8. (Spring)

125 **Marine Geology** (3) Pierce

Lecture and map work. Principles of oceanography and submarine geology; topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: Geol 1–2 or 21–22; or permission of instructor. (Spring)

128 **Geomorphology** (3) Teleki

Lecture (2 hours), laboratory as arranged. Nature and evolution of earth forms. (Spring)

136 **Engineering Geology** (3) Geiger

For students in the School of Engineering and Applied Science. Geological principles and processes and their application to civil and mechanical engineering. Prerequisite: Math 31, Phys 2 or 4; or permission of instructor. (Spring)

141 **Introductory Geochemistry** (3) Siegel

Lecture (2 hours), laboratory as arranged. Principles and theories on the abundance, relationships, and distribution of the elements in various rock and mineral species. Prerequisite or concurrent registration: Geol 117 or

equivalent; Chem 11–12; Math 30; Phys 1 or 3; or permission of instructor. Laboratory fee, $12. (Fall)

147 **Chemical Geology in the Earth and Ocean Sciences** (3) Siegel

Introduction to geochemical and chemical principles involved in geological systems and their application to contemporary problems in oceanology, pollution, and mineral exploration. Laboratory fee, $12.

151–52 **Invertebrate Paleontology** (3–3) Coates

Lecture and laboratory (5 hours), field trips as arranged. A systematic treatment of the invertebrate fossil groups, emphasis on the macroinvertebrates. Prerequisite: Geol 1–2 or 21–22; or permission of instructor. Laboratory fee, $12 a semester. (Academic year)

154 **Vertebrate Paleontology** (3) Hotton

Lecture (2 hours), laboratory or field as arranged. General features of vertebrate morphology and evolution; problems of paleoecology and adaptation. (Fall)

157 **Methods of Systematic Paleozoology** (3) Sohn

Lecture and discussion. Introduction to bibliographic source and rules of zoological nomenclature. Presentation of data, including synonymies and keys. Prerequisite: Geol 151–52 or permission of instructor. (Fall)

158 **Micropaleontology** (3) Sohn

Lecture (2 hours), laboratory as arranged. Identification with binocular microscope of important microfossil groups. Micropaleontological techniques. Prerequisite: Geol 157 or permission of instructor. Laboratory fee, $12. (Fall or spring)

163 **Sedimentation** (4) Lindholm

Lecture (2 hours), laboratory (4 hours), field trips as arranged. Principles of sedimentation, analysis and interpretation of sedimentary processes and environment, laboratory experiments in the properties of sedimentary particles. Prerequisite: Geol 111 or permission of instructor. Laboratory fee, $15. (Fall)

172 **Regional Geology** (2) Staff

Lecture, research, and discussion of major geologic or physiographic regions. Prerequisite: Geol 122. (Fall)

181 **General Oceanography** (3) Maloney

Chemical and physical properties of sea water, movements of water masses, meteorological interrelations, ecology of marine plants and animals. Prerequisite: Math 31 or equivalent, or permission of instructor. (Spring)

189 **Geophysics of the Solid Earth** (2) Zietz

Introduction to physical properties and origin of the surface features and interior of the earth. Prerequisite: Phys 1 or 3; or permission of instructor. (Fall)

195 **Field Work** (2) Staff

Weekend field trips. Surveying, geological mapping, and specific field work methods. (Spring)

199 **Undergraduate Research** (arr.) Staff

Problems approved by the staff. May be repeated once for credit. (Fall and spring)

THIRD GROUP

205 **Seminar in Geology** (3) Staff

Special topics each semester. May be repeated for credit. (Fall and spring)

214 **X-ray Mineralogy** (3) Appleman

Problems in X-ray mineralogy, crystal chemistry of rock-forming minerals. Laboratory fee, $15. (Fall or spring)

216 **Sedimentary Petrography** (3) Lindholm

Identification, classification, and interpretation of common sedimentary rocks by means of the petrographic microscope. Prerequisite: Geol 112, 163; or permission of instructor. Laboratory fee, $15. (Spring)

219 **Petrogenesis I** (3) Lewis

The origin of selected igneous and metamorphic rock types. Laboratory fee, $15. (Fall)

220 **Petrogenesis II** (3) Lewis

Laboratory fee, $15. (Spring)

224 **Advanced Structural Geology** (3) Lewis

Rock deformation. Methods of study and the formation of structurally complex rock. Tectonics. Prerequisite: Geol 122 or permission of instructor. (Fall)

241 **Geochemistry** (3) Siegel

Chemical composition and physical properties of sea water, chemical composition and alterations of marine sediments, thermodynamics and biochemical activity in oceans. Methods of analysis and problems of measuring. Prerequisite: Math 31 and permission of instructor. Recommended: Chem 22. Laboratory fee, $18.

243 **Geochemical Prospecting** (3) Siegel

Application of geochemical principles and analyses to the detection of hidden ore deposits. Field trips as arranged. Laboratory fee, $15. (Spring)

246 **Physical Chemistry in Relation to Geologic Problems** (3) Staff

Application of thermodynamics to phase equilibria studies of minerals and rocks.

249 **Seminar: Geochemistry** (2) Siegel

Independent topics each semester; may be repeated for credit. (Fall or spring)

253 **Bioassociational Studies in Paleontology** (3) Hazel

Analysis and interpretation of the distribution of marine animals with emphasis on biogeographic, paleoclimatologic, and biostratigraphic inferences and multivariate techniques.

254 **Interpretive Paleontology** (3) Kauffman and Staff

Comparative study of form and function in fossil and recent organisms as related to the interpretation of evolution. Prerequisite: Geol 151–52. (Spring)

255 **Population Paleoecology** (3) Buzas

Characteristics of populations applicable to the fossil record. Subject matter includes ecosystem concept, habitat, Hutchinsonian niche, life-death, size-frequency distributions, competitive exclusion principle, spatial distributions, relative abundance and diversity, quantification of community biofacies. Prerequisite: Geol 151–52, Stat 91; or permission of instructor. (Fall)

263 **Advanced Sedimentology** (arr.) Pierce

Prerequisite: Geol 163. Laboratory fee, $15. (Spring)

266 **Stratigraphy** (3) Coates, Kauffman

Physical and geological stratigraphy.

288 **Geophysics for Geologists** (3)

Basic geophysics to assist the geologist in mapping and solving geologic problems. Prerequisite: Math 31; Phys 1, 2; or permission of instructor. (Fall)

295 **Research** (arr.)

Research on problems approved by the Staff. Open to qualified students with advanced training. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Germanic Languages and Literatures

Professors J.C. King, Klaus Thoenelt
Associate Professor Carl Steiner (*Chairman*)
Assistant Professorial Lecturer Margaret Guenther
Instructor B.K. Netland
Lecturers Blanche Gardner, Peter Werres

Bachelor Arts with a major in Germanic Languages and Literatures (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.

2. Prerequisite courses—Germ 1–2, 3–4, 9–10, 51–52; or equivalent.
3. Required courses in other areas—6 semester hours of history, and 6 semester hours in one of the following subjects: art history, music history, or philosophy.
4. Requirements for the major—a minimum of 24 semester hours in German courses above the first group, including Germ 179–80; reasonable proficiency in speaking, reading, and writing German.

Master of Arts in the field of Germanic Languages and Literatures.—Prerequisite: a Bachelor of Arts degree with a major in Germanic Languages and Literatures from this University, or an equivalent degree.

Required: the general requirements, pages 90–97, including a reading knowledge of French. The program of study consists of (1) 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours) in the field of German literature or linguistics or, with departmental approval, (2) 30 semester hours of approved course work without a thesis.

Bachelor of Arts in Education with a teaching field in German.—Prerequisite: the Education curriculum, pages 76–77.

Required: the German option and the professional courses listed on pages 112, 117.

The Department of Germanic Languages and Literatures, through the Consortium of Universities of the Washington Metropolitan Area, Inc., cooperates in a program leading to the degree of Doctor of Philosophy at Georgetown University.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

GERMAN

FIRST GROUP

1–2 **First-year German** (3–3) . Staff

Fundamental concepts of German culture; essentials of German structure and basic vocabulary; reading of easy prose and conversation. Aural-oral practice in language laboratory. Prerequisite to Germ 2: Germ 1. Laboratory fee, $17.50 a semester. (Germ 1 and 2—fall and spring)

*3–4 **Second-year German** (3–3) Staff

Introduction to German civilization, selections from modern German prose, continuation and review of German structure, conversation and simple composition. Aural-oral practice in language laboratory. Prerequisite to Germ 3: Germ 1–2 or equivalent. Prerequisite to Germ 4: Germ 3. Laboratory fee, $17.50 a semester. (Germ 3 and 4—fall and spring)

*9–10 **German Conversation and Composition** (3–3) Staff

(Academic year)

47 **Beginning German for Reading Acquisition** (3) Staff

(Formerly Beginning German for Reading Examination Candidates (0))

For undergraduates and graduate students with little or no German who are interested in acquiring a reading knowledge of German. No academic credit for graduate students. (Fall)

* With permission of instructor, Germ 9 or 10 may be taken concurrently with Germ 4.

49 **German Readings for Nonmajor Students** (3) Staff

Primarily for graduate students preparing for reading examinations, undergraduates admitted. No academic credit for graduate students. Prerequisite: Germ 4 or 47, or equivalent. (Spring)

51–52 **Introduction to German Literature—in English** (3–3) Guenther

Lecture, recitation, and discussion. Selected readings in German literature from the earliest periods to the present. (Academic year)

SECOND GROUP

103–4 **Major Themes of German Literature—in English** (3–3) Thoenelt

Lecture and discussion. Selected works of Goethe, Thomas Mann, Hesse, Böll, and others. Topics for 1974-75: Germ 103—The "Faust" theme in German thought and civilization, from Goethe to Thomas Mann; Germ 104—The "Wilhelm Meister" theme in German thought and civilization, from Goethe to Böll. (Academic year 1974-75 and alternate years)

111–12 **Comparative Studies in Germanic Literatures—in English** (3–3) Thoenelt

Lecture and discussion. Topics for 1975-76: Germ 111—Absurdity and rebellion, loss and rediscovery of the self, from Existentialism back to Enlightenment, selected works of Thomas Mann, Böll, Frisch, Hesse, Strindberg, Goethe, and others; Germ 112—Individualism in German thought and civilization; the meaning of truth in education and self-realization as reflected in German 18th and 20th century literature, selected works of Goethe, Novalis, Thomas Mann, Böll, and others. (Academic year 1975-76 and alternate years)

131–32 **18th Century German Literature—in German** (3–3) Thoenelt

Enlightenment, Storm and Stress, Classicism. Reading, lecture, and discussion. (Academic year 1975–76)

141–42 **19th Century German Literature—in German** (3–3) Steiner

Romanticism, Biedermeier, Young Germany, Realism. Reading, lecture, and discussion. (Academic year 1974–75 and alternate years)

151–52 **20th Century German Literature—in German** (3–3) Steiner

The age of Nietzsche, Naturalism, Impressionism, Expressionism; Kafka, Thomas Mann, Hesse; émigré literature, contemporary drama; authors of Gruppe 47. Reading, lecture, and discussion. (Academic year 1975-76 and alternate years)

161–62 **Studies in Modern German Literature—in English** (3–3) Steiner

Readings of representative writers of modern German prose; lecture and discussion in English. Topic for 1974–75: Kafka and Hesse. Despair and hope in modern German thought. (Academic year 1974–75 and alternate years)

179–80 **Advanced German Conversation and Composition** (3–3) Thoenelt

Discussions and compositions on literary and cultural topics, readings in newspaper articles, interpretations of selected texts (Gottfried Benn and Thomas Mann), grammar and style studies. (Academic year 1974-75 and alternate years)

THIRD GROUP

201–2 **Middle High German** (3–3) King
(Academic year 1975–76 and alternate years)

209–10 **Old High German** (3–3) King
(Academic year 1974–75 and alternate years)

211–12 **History of the German Language** (3–3) King

213–14 **Old Norse** (3–3) Allee
(Academic year 1975–76 and alternate years)

225–26 **Seminar: Linguistics** (3–3) King, Allee
Bibliography, methodology, readings, and research problems.

231–32 **German Classicism** (3–3) Thoenelt
Advanced study and critique of the classical literature of the Goethe era. Prerequisite: Germ 131–32 or equivalent. (Academic year 1974–75 and alternate years)

251–52 **Seminar: Studies in 20th Century German Literature** (3–3) Steiner
Special projects in fiction, drama, poetry, and criticism. Topic for 1974–75: *Die Gruppe 47.* (Academic year 1974–75 and alternate years)

271–72 **Seminar: German Realism** (3–3) Steiner
Analysis of authors, works, genres, and literary trends. Topics for 1975–76: *Die Novelle des poetischen Realismus.* (Academic year 1975–76 and alternate years)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

SANSKRIT

SECOND GROUP

105–6 **First-year Sanskrit** (3–3) King
A year course: credit toward a degree at this University given on completion of Germ 106. Language, literature, and culture of ancient India. Essentials of grammar; reading of classical and Vedic texts. Aural-oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Academic year 1975–76 and alternate years)

107–8 **Second-year Sanskrit** (3–3) King
A year course: credit toward a degree at this University given on completion of Germ 108. Language, literature, and culture of ancient India. Continuation and review of grammar; reading of more difficult classical and Vedic texts. Aural-oral practice in language laboratory. Prerequisite: Germ 105–6 or equivalent. Laboratory fee, $17.50 a semester. (Academic year 1974–75 and alternate years)

*SCANDINAVIAN

FIRST GROUP

81–82 **Beginning Scandinavian** (3–3) Netland

Introduction to Norwegian and introductory reading approach to Danish and Swedish. Fundamental concepts of Scandinavian civilization. Scan 81: Norwegian, language and structure; reading, conversation, and composition. Presentation of Scandinavian culture. Scan 82: additional reading, conversation, and composition in Norwegian. Reading approach to Danish and Swedish. Credit will be given for each semester. Aural-oral practice in language laboratory. Laboratory fee, $17.50 a semester. Prerequisite to Germ 82: Germ 81. (Academic year)

83–84 **Intermediate Scandinavian** (3–3) Netland

Intermediate Norwegian; reading, conversation, and composition. Additional reading in Danish and Swedish. Outlines of modern Scandinavian culture, including a brief introduction to Icelandic. Students will select a special study project within the course framework. Credit will be given for each semester. Aural-oral practice in language laboratory. Laboratory fee, $17.50 a semester. Prerequisite to Germ 83: Germ 82 or equivalent. Prerequisite to Germ 84: Germ 83. (Academic year)

Greek

See "Classics."

Health Care Administration

Professors Leon Gintzig (*Chairman*), Louis Block (*Visiting*)
Professorial Lecturers M.J. Taves, H.L. Hirsh, W.A. Hamrick
Associate Professors R.R. Bonato (*Research*), G.E. Morris, M.C. Devolites, P.N. Reeves, K.J. Darr
Adjunct Associate Professor P.S. Birnbaum
Associate Professorial Lecturers W.A. Parker, D.D. Pointer, Aladino Gavazzi, L.W. Katz
Assistant Professors W.H. Guy (*Research*), K.C. Yang (*Research*), R.G. Shouldice
Adjunct Assistant Professors W.J. Auton, J.D. Bentley, W.J. Green, Jr., W.J. Landen, R.L. White
Assistant Professorial Lecturers H.R. Wertlieb, Sami Khoury, T.L. Schmidt, N.B. Hadley
Instructors Patricia Cleary (*Research*), Richard Switalski (*Research*), D.F. Bergwall
Adjunct Instructors T.J. Delaney, G.R. DeLisle, S.T. Fisher, R.B. Hinds, N.G. Oglesby

* At present, the offering does not satisfy language requirements and is contingent upon sufficient enrollment. Second-, third-, and fourth-semester Scandinavian (with reading approach to Danish or Swedish) will be available subject to sufficient demand.

The program of study leading to the degree of *Bachelor of Science in Health Care Administration* is currently being offered only at the Naval School of Hospital Administration; for further information contact the Chairman of the Department of Health Care Administration.

Programs of study in Health Care Administration leading to the degrees of *Master of Arts in Health Care Administration, Master of Business Administration, Master of Public Administration, Post-Master's Graduate Certificate in Health Care Administration, Doctor of Business Administration,* and *Doctor of Public Administration* are offered by the School of Government and Business Administration (see pages 130–59).

SECOND GROUP

Except for HCA 153 and 154, the following second-group courses are limited to students in the Bachelor of Science in Health Care Administration degree program at the Naval School of Hospital Administration.

108 **Survey of Health Economics** (3) Stallings

Survey of the principles and applications of economic analysis as applied to the health field. Economic criteria required for cost effectiveness, operations analysis, and resources management.

110 **Introduction to Health Care Planning** (3) Fisher, Schmidt

Introduction to health care program and facility planning. Emphasis on the role and function of planning agencies, estimation of needs, assessment of community and facility resources, collection of data, and evaluation of program and facility design.

120 **Personnel Relations in Health Care Institutions** (3) Fisher

Introduction to personnel relations in the health care environment. Research studies, as they pertain to the concepts of leadership and superior-subordinate relations in a multidisciplinary organization, evaluated for practical application. Emphasis on employee cooperation, differences in ability and background, and particular problems caused by specific working conditions.

130 **Hospital Labor Relations** (3) Fisher

Introduction to a brief history of unionism, characteristics of union organizations and union movements, and the basic reasons why the government became involved in employer-employee relations. Labor laws and National Labor Relations Board decisions studied in terms of their application to health care facilities. Management's role in the collective bargaining process and the administration of and "living" with collective bargaining agreements.

140 **Hospital Financial and Material Management** (3) Hinds

Principles, practices, functions, and objectives of financial and material management in support of hospital operations; emphasis on the role and contributions of middle management. Costs and budgetary control, responsibility accounting, cost-based budgets, purchasing, inventory control, distribution, and storage.

142 **Financial Management in Health Care Institutions** (3) Hinds

Consideration of the nature, analysis, and interpretation of accounting data. Cost accounting, budgeting, and internal control techniques, emphasis on their use in the management planning and control process.

153 **Survey of Health Care Organization** (3) Parker, Bentley
(Formerly Survey of Health Care Organization and Procedures)
Introduction to the organization and delivery of health care services in the United States. Emphasis on the structural features of and the resources available to the health care system. (Fall and spring)

154 **Introduction to Hospital Management and Procedures** (3) Parker, Fisher
(Formerly Survey of Health Care Organization and Procedures)
Introduction to the structure and management of contemporary American hospitals; emphasis on the organization of hospital departments and on the functions of the department manager. (Fall and spring)

155 **Special Problems in Health Care Management** (3) DeLisle
Supervised reading program in which the student is expected to review the literature on a middle-management problem present in contemporary American health care institutions.

159 **Legal Issues in Health Care Administration** (3) Landen
Recognition and comprehension of areas of legal liability in hospital activities. Knowledge and understanding of a wide variety of administrative duties and responsibilities of a legal nature, such as administrative investigations, misconduct and line of duty determinations, administrative discipline and discharge, claims under the Medical Care Recovery Act, Federal Tort Claims Act, and other related matters.

162 **Survey of Hospital Informations Systems** (3) Delaney
Development and discussion of a computerized integrated information system, its effect on the environment, and its use within the organizational system for planning and control. Analysis of actual information systems used in hospitals.

170 **Quantitative Methods in Health Care Administration** (3) Pointer
Introduction to the application of quantitative methods to the health services industry. Fundamental statistical techniques enabling the student to read, comprehend, critically appraise, and intelligently utilize the growing volume of quantitative research appearing in the health services literature. Familiarization with quantitative procedures applied to analyzing management problems in the operational environment. Emphasis on establishing a fundamental understanding of statistical "ideas" rather than upon manipulating predeveloped formulas.

175 **Analysis in Health Care Administration** (3) White
Skills, methods, research, and analysis of the middle management problem in health care administration.

180 **Management Case Problems in Hospital Administration** (3) Oglesby
Study of the management functions as applied in the hospital setting. Management case problems in hospital administration areas such as authority relationships, communication barriers, motivation and productivity, and control techniques discussed and analyzed.

THIRD GROUP

202 **Introduction to Health Care** (3) Darr, Khoury
Lecture and discussion (2 hours), laboratory (2 hours). Survey of

ganization, functions, trends, and issues among governmental, nongovernmental, voluntary sectors; survey of major diseases by organ systems and their impact on administration and planning; medical terminology. (Fall and spring)

203 **Health Care Organization and Management** (3) Devolites, Nolan

Lecture and discussion (2 hours), laboratory (2 hours). History and current character of institutional health care. Organizational functions and structure of various kinds of health care facilities. Prerequisite or concurrent registration: Mgt 201. (Fall and spring)

204 **Management of Health Maintenance Organizations** (3) Shouldice

Basic principles and fundamentals of prepaid group practice plans and newly forming health maintenance organizations. Emphasis on planning, development, and operation of prepaid plans. (Fall)

205 **Hospital Management Procedures** (3) Darr, Gavazzi

Lecture and discussion (2 hours), laboratory (2 hours). Departmental administration. Survey of hospital law; hospital forms, procedures, and systems; and hospital programs pertaining to disaster relief, safety, fire prevention. (Fall and spring)

206 **Case Studies in Health Care Administration** (3) Devolites

Discussion (2 hours), laboratory (2 hours). General ideas about administration applied to practical cases. Emphasis on policy-making, planning, controlling, and organizing. Prerequisite: HCA 203 and Mgt 201. (Fall and spring)

207 **Management Analysis in Health Care Institutions** (3) Shouldice

Lecture (2 hours), laboratory (2 hours). Basic investigation and problem-solving techniques, including various methods of collecting, analyzing, reporting, and using information that can be made available to administrators of hospitals and other medical care institutions. (Fall and spring)

209 **Health Care Economics and Financial Management** (3) Block

Lecture (2 hours), laboratory (2 hours). Economic and financial analysis of the interactions between consumers and providers of health care, and public and private prepayment and insurance programs. Industry price structure and the long- and short-term capital requirements. (Fall and spring)

210 **Advanced Financial Management of Health Care Institutions** (3) Block and Staff

Nature and interpretation of health care institution financial reports. Techniques of financial planning and control; operation of third-party reimbursement contracts; capital needs, planning, and acquisition; case studies, field research. Prerequisite: HCA 209. (Fall or spring)

212 **Health Project Planning** (3) Reeves, Bergwall

Lecture (2 hours), laboratory (2 hours). Basic health planning methods and procedures for those students engaged in planning a specific facility or service. Prerequisite: HCA 202 and 203. (Fall and spring)

213 **Administration of Health Care Systems** (3) Gintzig

Comparative evaluation of various organizational patterns, functions, and

trends in health care systems. Emphasis on the sources of such differences and significance of the systems to the health care of a nation. (Fall or spring)

214 **Health Systems Planning** (3) Reeves

Advanced health planning for those students concerned with development of health systems; emphasis on the legal, political, social, and economic factors influencing health planning. Prerequisite: HCA 212. (Fall or spring)

215 **Practicum in Health Project Planning** (3) Bergwall

Supervised practical instruction in agencies doing comprehensive health planning; emphasis on basic investigation and problem-solving techniques, including various methods of collecting, analyzing, and reporting data. Prerequisite: HCA 212. (Fall or spring)

216 **Seminar: Health Systems Planning** (3) Reeves and Staff

An analysis of the effect of legal, political, social, and economic factors on the planning of health systems. This analysis will be conducted through the use of games and simulation models. Prerequisite: HCA 214 and 215. (Fall or spring)

250 **Delivery of Mental Health Services** (3) Morris

Study of the organizations and systems for the delivery of mental health services; emphasis on administration, management, and financial support of treatment and rehabilitation facilities.

260 **Seminar: Administration for Long-term Care** (3) Wertlieb

Comparative evaluation of characteristics of long-term care institutions, e.g., extended care, skilled nursing homes, homes and housing for the aged, etc.; relation of the purposes and functions of these institutions to the total health needs of the community. (Fall)

261 **Seminar: Administration for Long-term Care Institutions** (3) Wertlieb

Designed to improve the ability and effectiveness of health administrators through a foundation of knowledge and skills in health facility organization and management. Emphasis on range of services available in long-term care institutions.

265–66 **Readings in Long-term Care Administration** (3–3) Staff

Advanced studies in selected aspects of administration of long-term care facilities. (Fall or spring)

267 **Social Gerontology for the Administrator** (3) Tave

Special characteristics of the elderly with which administrators of long term care facilities should be acquainted. (Fall and spring)

270 **Research in Health Care Administration** (3) Gintzig, Reeves

Field research. Primarily for doctoral students; open to other graduate students with consent of instructor. May be repeated for credit. (Fall or spring)

285–86 **Readings in Health Care Administration** (3–3) Staff

Supervised readings in special areas or subdivisions of health care administration and planning. Primarily for doctoral students; open to other students by arrangement. (Academic year)

287 **Seminar: Integration of Health Care Administration** (3) Staff
Primarily for doctoral students; open to other students by arrangement. May be repeated once for credit. (Fall)

288 **Seminar: Field Problem Studies in Health Care Administration** (3) Reeves, Gintzig
Selected administrative and planning issues and problems arising in health care facility situations. Primarily for doctoral students; open to other students by arrangement. May be repeated for credit. (Fall or spring)

293–94
–95 **Residency I** (3–3–3) Staff
Twelve-month residency, beginning June 1 or July 1. Work experience under a qualified preceptor, periodic written progress reports, and a written major report.

296–97
–98 **Residency II** (3–3–3) Gintzig
For selected students who take a second twelve-month residency; begins June 1 or July 1.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to doctoral students preparing for the general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to doctoral candidates. May be repeated for credit. (Fall and spring)

Hebrew

See "Classics."

History

Professors R.H. Davison, R.B. Thompson, F.H. Michael, R.C. Haskett, R.P. Sharkey, H.M. Sachar, R.W. Kenny (*Chairman*), P.P. Hill, Letitia Brown
Adjunct Professors R.P. Multhauf, Frederick Gutheim
Associate Professors C.J. Herber, W.R. Johnson, Lois Schwoerer, Linda DePauw, Richard Thornton, R.A. Hadley
Associate Professorial Lecturer Horia Socianu
Assistant Professors A.D. Andrews II, S.A. Grant, P.F. Klarén, R.E. Kennedy, Jr., L.P. Ribuffo

Bachelor of Arts with a major in History (Field-of-Study).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.)

2. Prerequisite courses—Hist 39–40, 71–72; or equivalent.

3. Required courses in related areas—(a) either 12 semester hours of one introductory foreign language (French, German, Greek, Hebrew, Italian, Latin, Russian, or Spanish, or another approved language relevant to the student's program); or (b) 12 semester hours of Statistics (Stat 53 or 104; Stat 97; 105; and one course selected from Stat 131, 159, 188).

4. The passing of the History major examination in the senior year.

The major, and the major examination which attests it, is centered on the study of the Mediterranean rise, European development, and trans-Atlantic spread of Western civilization, its interaction with other civilizations in a world context, and its continuing challenges to the present day. Under the guidance of an adviser the student will arrange his program in History to attain, insofar as possible, a balanced evaluation of (1) the rise of civilization in Europe from its classical origins to the eve of the French Revolution; (2) the historic problems of modern Europe in the age of industry and ideology since 1789; (3) the political, social, economic, and cultural forces of the United States in their world setting since 1607; and (4) the nature and development of civilization in the principal areas outside of the North Atlantic community. Each major program must include at least 6 semester hours in second-group courses in each of 3 of the 4 areas, or 6 semester hours in two areas and 3 semester hours in each of the other two. Two 3-hour seminars, at least one of which must be research, are also required as a part of each major's program (except Honors Program, see below). A required proseminar (Hist 199) is a means of integrating the student's understanding of the continuity of Western civilization in its world context. A pamphlet relating to the major is available in the offices of the Dean of Columbian College of Arts and Sciences and the Department of History.

An Honors Program may be chosen by juniors with satisfactory scholastic records. Application to this Program must be made shortly before completion of the first semester of the junior year. Students accepted into the Program take a 3-hour research seminar in the second semester of the junior year and complete the research requirements for the history major by preparing the Senior Honors Thesis (Hist 191–92) in the final year of undergraduate study.

Master of Arts in the field of Classical Archaeology, Classics, and History (an interdepartmental degree program offered by the departments of Art, Classics, and History).—Prerequisite: a Bachelor's degree with a background in Classical Archaeology and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–97. The program of study consists of 24 semester hours of course work (as many as possible should be third-group courses) selected in consultation with the appropriate adviser from the departments of Art, Classics, and History: plus a thesis (equivalent to 6 additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

Master of Arts in the field of History.—Prerequisite: a Bachelor's degree from an accredited college or university with a major in history, or an equivalent degree; high scholastic standing; and approval of the Department. Applicants from other institutions must present scores on the Graduate Record Examination with the Advanced Test in History and arrange for four persons, preferably former instructors,

to send letters or reference forms to the Office of the Gaduate School of Arts and Sciences.

Required: the general requirements, pages 90–97. Candidates must complete either (1) a minimum of 30 semester hours of second- and third-group courses, including Hist 299–300 *Thesis Research*, or (2) a minimum of 36 semester hours of second- and third-group courses, including at least two research seminars (6 semester hours). At least 6 semester hours of each candidate's program must be in third- or fourth-group History courses; a maximum of 6 may be in approved courses outside the Department of History. Master's candidates are responsible for arranging with instructors of second-group courses for extra work, in order to receive graduate credit for such courses. Each student works in two fields of history.

Doctor of Philosophy in the field of History.—Required: the general requirements pages 90–94, 97–99, including the passing of a written examination in two appropriate foreign languages, or one foreign language and an approved tool subject, and the satisfactory completion of the General Examination in four fields. Normally, each doctoral candidate will work in one major (or general) field of study and three special fields. The major fields include the following: Ancient History, Medieval Europe, Early Modern Europe, Modern Europe, United States, Latin America, Modern Near East, Modern Far East, Russia and East Europe. Special fields may vary from the topical (e.g., U.S. Social History, European Intellectual History, etc.) to the chronologically limited fields (e.g., American Colonial History, Tudor and Stuart England, etc.). A student may elect one special field outside of the Department of History if it is relevant to his program.

Bachelor of Arts in Education with a teaching field in History.—Prerequisite: the Education curriculum, pages 76–77.

Required: the History option and the professional courses on pages 112–13, 117.

Doctor of Philosophy fields of study in International Relations combine work in Economics, History, and Political Science.

Departmental prerequisite: Hist 39–40 or former 91–92 is prerequisite to courses 108 through 158 and 187 through 196; Hist 71–72, to courses 167 through 186; either Hist 39–40, 71–72, or former 91–92, to courses 161 through 166. Prerequisite to Hist 105–6 is either Hist 39–40, former 91–92, or a background in a science. Students may waive one or more of the prerequisite courses by passing a departmental waiver examination, by attaining scores of 600 or above on the College Entrance Examination Board Achievement tests, or by good performance on Advanced Placement Examinations.

FIRST GROUP

39–40 **European Civilization in Its World Context** (3–3) **Staff**

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present. (Academic year)

71–72 **Introduction to American History** (3–3) **Staff**

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from 1492 to 1861. Hist 72: from 1861 to present. (Academic year)

SECOND GROUP

101 **History of Culture** (3) **Thompson**

Interpretive analysis of the major civilizations to the 16th century. Theories of Hegel, Spengler, and Toynbee. (Fall)

102 **History of Revolution** (3) Thompson

Interpretive analysis of revolutions since the 16th century. Examination of Cromwell, Robespierre, Marx, Lenin, and Mao. (Spring)

105–6 **History of Science** (3–3) Multhauf

Hist 105: from ancient natural philosophy through the 17th century scientific revolution. Hist 106: scientific development from the 18th to the early 20th century. (Academic year)

108 **The Ancient Near East and Egypt to 322 A.D.** (3) Hadley

Survey of Egyptian, Mesopotamian, Anatolian, West Semitic, and Iranian civilizations from the Neolithic period to the Islamic conquest.

109 **Early Aegean and Greek Civilizations to 338 B.C.** (3) Hadley

Neolithic background: Bronze age—Minoan, Helladic, and Mycenaean civilizations; classical Greek civilization to the eve of the Roman conquest. (Fall)

110 **The Roman World to 337 A.D.** (3) Hadley

Prehistoric Italy; rise and decline of the Roman Empire and Latin civilization; cultural, social, and political developments in the Greek world under Roman rule. (Spring)

111–12 **Medieval History** (3–3) Andrews

Development of the Latin Christian community. Hist 111: 4th to 11th century. Hist 112: 11th to 13th century. (Academic year)

113 **Early Middle Ages** (3) Andrews

Mediterranean region from 4th to 11th century; emphasis on Byzantium.

116 **History of Africa** (3)

Survey of political, cultural, and economic development from ancient times to the present.

121 **The Renaissance in Western Europe** (3) Schwoerer

The Renaissance City, concepts of the ideal man and woman, the discovery of new worlds, Machiavelli, historiography of the period.

122 **The Reformation in Western Europe** (3) Herber

Religious, political, and social consequences of the theological upheavals of the 16th century. (Spring)

*127 **Theories of History** (3) Lavine

Critiques of philosophies of history: idea of progress, historicism, Hegelian-Marxian dialectic, cyclical and social-scientific views. Contemporary problems of historical knowledge. (Fall)

131–32 **History of Germany** (3–3) Herber

Political, social, and cultural development. Hist 131: from Reformation to unification. Hist 132: from unification to present.

138 **History of World Communism** (3) Thornton

The international communist movement from its beginnings to the present. (Spring)

* An interdepartmental course offered by the departments of History and Philosophy.

139–40 **World History in the 20th Century** (3–3) Sachar

Diplomatic, political, and cultural factors. Hist 139: from the turn of the century to the Munich settlement of 1938. Hist 140: from the Munich settlement to present. (Academic year)

141–42 **History of France** (3–3) Kennedy

Political, social, and cultural development. Hist 141: from Henri IV to Napoleon. Hist 142: from Napoleon to present.

143 **History of Eastern Europe** (3) Socianu

Poland, the Danube countries, and the Balkans in the 19th and 20th centuries. (Fall)

144 **History of Russia: Medieval to1700** (3) Grant

Russian history to the reign of Peter the Great. (Fall)

145 **History of Russia: 18th and 19th Centuries** (3) Grant

From the reign of Peter the Great to the Russian Revolution. (Spring)

146 **History of Russia: Soviet Russia** (3) Thompson

Revolution and Soviet rule to the present. (Fall)

*147 **Economic History of Europe** (3) Sharkey

Economic development since the Middle Ages; emphasis on the period following the Industrial Revolution. Evolution of capitalism and its impact upon the societies of Europe. (Spring)

149–50 **European Diplomatic History** (3–3) Davison

Emphasis on policies and actions of the great powers and their statesmen. Hist 149: 1812 to 1890. Hist 150: since 1890. Students who receive credit for Hist 150 cannot receive credit for Hist 157. (Academic year)

151–52 **History of England and Great Britain** (3–3) Kenny

Development of English civilization and its impact on Western culture. Hist 151: to 1689. Hist 152: since 1689. (Academic year)

153 **Tudor England** (3) Kenny

Aspects of the constitutional, social, intellectual, and religious development of England, 1485–1603.

154 **Stuart England** (3) Schwoerer

Grand Rebellion, Restoration, and Glorious Revolution. The political, religious, intellectual, and social development of England, 1603–1714. (Spring)

157 **20th Century European Diplomatic History** (3) Sachar

The main currents, with necessary 19th century background. Students who receive credit for Hist 157 cannot receive credit for Hist 150. (Fall)

158 **Modern Jewish History** (3) Sachar

A secular history of the Jewish people from the 18th century to the pres-

* An interdepartmental course offered by the departments of History and Economics.

ent state of Israel; emphasis on European political, economic, and cultural influences. (Spring)

161 **Revolution in 20th Century Latin America: the Mexican and Cuban Experience** (3) Klarén

Social, economic, and political forces working to undermine the traditional fabric of Latin American society; emphasis on historical roots of revolutionary movements. (Spring)

163–64 **History of Latin America** (3–3) Klarén

Political, socioeconomic, and cultural development. Hist 163: colonial period. Hist 164: national period. (Academic year)

165 **History of Brazil** (3) Klarén

Political, socioeconomic, and cultural aspects from pre-Columbian times to the present.

166 **History of Mexico** (3) Klarén

Political, socioeconomic, and cultural aspects from pre-Columbian times to the present. (Fall)

167 **American Colonial History** (3) Haskett

Settlement of colonies, development of provincial institutions, and emergence of American civilization in the 17th and 18th centuries. (Spring)

169 **The American Revolution** (3) DePauw

The political, intellectual, social, and economic significance of the events leading to the War for American Independence and the adoption of the Federal Constitution. (Fall)

170 **U.S. Early National History** (3) Hill

Political, diplomatic, economic, and social history of the early republic, 1789–1828. (Fall)

171–72 **U.S. Social History** (3–3) Brown

Hist 171: daily life, institutions, intellectual and artistic achievements of the Agrarian Era, 1607–1861. Hist 172: the Urban-Industrial Era from 1861 to present.

173–74 **Afro-American History** (3–3) Brown

The place of Black Americans in the corpus of American history. (Academic year)

175–76 **U.S. Political History** (3–3) Haskett

Hist 175: to the Civil War. Hist 176: Civil War to 1960. (Academic year)

177 **The Ante-bellum South** (3) DePauw

Political, economic, intellectual, and cultural characteristics of the American South before the Civil War. (Spring)

178 **Recent U.S. History** (3) Ribuffo

Political, social, and intellectual history from 1890 to the present. (Fall)

*179–80 **U.S. Economic History** (3–3) Sharkey

Process of economic growth from Colonial times to the present. Development of various sectors in the economy and their interdependence. Hist 179: 1607–1865. Hist 180: from 1865 to present. (Academic year)

181–82 **U.S. Diplomatic History** (3–3) Hill

Survey of American foreign relations from the era of the American Revolution. Hist 181: to 1898. Hist 182: 20th century. (Academic year)

183 **Oversea Expansion of the United States** (3) Staff

Political, economic, social, and cultural life of our outlying possessions.

185 **Women in America** (3) Staff

Survey of the political, cultural, economic, and social activities of the female half of the population from the Indian natives and Norse discoverers to the present day.

186 **U.S. Urban History** (3) Gillette

Development and characteristics of American cities. (Fall)

187 **History of Modern China** (3) Johnson

China since 1840, particular attention to political developments. (Fall)

188 **History of Chinese Communism** (3) Thornton

Survey of the leadership, ideology, structure, and operation of the Chinese revolutionary movement from its founding to the present. (Fall)

189 **History of Modern Japan** (3) Sigur

Japan's century of modernization—from the Meiji Restoration of 1868 to the present. Emphasis on historical, political, economic, and cultural factors. (Fall)

191–92 **Senior Honors Thesis** (3–3) Staff

Required of and open only to undergraduate honors candidates in history. (Academic year)

193 **History of the Near East** (3) Davison

Byzantine, Arab, Persian, and Islamic backgrounds; rise and decline of the Ottoman Empire; action of European powers in the area; Ottoman breakup into the Turkish Republic and other states.

194 **History of the Modern Near East** (3) Davison, Sachar

Beginning with Napoleon's invasion of Egypt. Interaction of Europe with western Asia, emphasis on the Turkish Straits, Suez, Anglo-French imperialism; Turkish, Balkan, Arab, and Jewish nationalism, and the recent Soviet intrusion. (Fall)

195–96 **History of East Asia** (3–3) Johnson

Civilizations of China and Japan; emphasis on institutional development. Hist 195: beginnings to about 1800. Hist 196: from eve of the modern era to present. (Academic year)

199 **Proseminar: Readings for the History Major** (3) Staff

Required of senior history majors. Readings and discussions on major trends in history; representative selections from the classics of historical

* An interdepartmental course offered by the departments of History and Economics.

literature. Students who receive credit for Hist 199 cannot receive credit for Hist 201. (Fall and spring)

THIRD GROUP

Prerequisite to all third-group History courses: the appropriate second-group preparation and consent of instructor.

201 **History and Historians** (3) Staff

Students who receive credit for Hist 201 cannot receive credit for Hist 199. (Fall and spring)

203–4 **Research Seminar** (3–3) Staff

Prerequisite: approval of Department. (Academic year)

205–6 **Seminar: Modern History of Eastern Europe** (3–3) Petrov

East Central and Southeastern Europe in the 19th and 20th centuries. Hist 205: to the mid-1930's. Hist 206: to the communist take-over (1948). (Academic year)

207 **Seminar: the Communist Party of the Soviet Union** (3) Grant

Evolution of the communist movement in Russia. Party congresses, Comintern, Cominform, and other fundamentals of international communist organization. (Spring)

208 **Research Seminar: History of World Communism** (3) Thornton

Prerequisite: Hist 138 or equivalent.

209–10 **Seminar: Ancient History** (3–3) Hadley

Prerequisite: Hist 108, 109, or 110; or equivalent. (Academic year)

211–12 **Seminar: Medieval History** (3–3) Andrews

Prerequisite: Hist 111–12 or equivalent. Students with working knowledge of Latin may receive Research Seminar credit. (Academic year)

214 **Evolution of the Socialist Commonwealth** (3) Petrov

History of Soviet relations with East European countries and the socialist states of Asia, from the end of World War II to the break with the People's Republic of China; emphasis on the changes in form and substance in relations among the ruling communist parties. For graduate students; open to qualified undergraduate seniors.

215–16 **Junior Seminar** (3–3) Staff

Primarily for juniors. Study and discussion of selected topics. Admission by permission of instructor. (Academic year)

217–18 **Seminar: Russian and Soviet Thought** (3–3) Grant

Prerequisite: Hist 145 or 146, or equivalent. (Academic year)

*225 **History of Washington, D.C.** (3) Brown

†231 **Seminar: Sino-Soviet Relations** (3) Michael

Background, development, and status of conflict within the communist movement; emphasis on the role of Chinese communists. Prerequisite:

* Offered jointly by the Department of History and the American Studies Program.
† An interdepartmental course offered by the departments of History and Political Science.

semester hours selected from Hist 187; P Sc 101, 194; or equivalent. (Spring)

237 **Seminar: Soviet Foreign Policy, 1917–1953** (3) Petrov
Revolutionary concept of diplomacy. Parallel instruments of foreign policy during era of "capitalist encirclement," 1917–1939. From Nazi-Soviet partnership to the alliance with the West. Foreign policies of the cold war. (Fall)

241–42 **Research Seminar: Modern European History** (3–3) Herber, Kennedy
Prerequisite: appropriate preparation and consent of instructor.

245 **Research Seminar: Revolutionary History** (3) Thompson
(Formerly Research Seminar: Revolutionary Russia)
Prerequisite: Hist 102 or consent of instructor.

246 **Research Seminar: Russian History** (3) Thompson
(Formerly Research Seminar: Revolutionary Russia)
Prerequisite: Hist 146 or consent of instructor.

247 **Research Seminar: the Theory and Practice of Modern Imperialism** (3) Sharkey
(Fall)

248 **Reading Seminar: Modern European and Near Eastern History** (3)
Admission by permission of instructor.

249–50 **Research Seminar: European Diplomatic History** (3–3) Davison
Prerequisite: one course chosen from Hist 149, 150, 193, 194; or equivalent. Reading knowledge of one modern language, preferably French, German, Russian, or Italian.

251–52 **Research Seminar: English History** (3–3) Kenny, Schwoerer
Prerequisite: Hist 151–52 or equivalent. (Academic year)

261–62 **Research Seminar: Latin American History** (3–3) Klarén
Prerequisite: 6 semester hours of undergraduate course work in Latin American History. (Academic year)

271–72 **Research Seminar: U.S. Social History** (3–3)
Prerequisite: Hist 171–72 or equivalent.

*273–74 **Research Seminar: Materials in Afro-American Culture** (3–3) Brown
Prerequisite: Hist 173–74 or equivalent. (Academic year 1975-76 and alternate years)

275–76 **Research Seminar: U.S. Political History** (3–3) Haskett
Prerequisite: Hist 175-76 or equivalent. (Academic year)

27? **Research Seminar: American History** (3)
Admission by permission of instructor.

281–82 **Research Seminar: U.S. Diplomatic History** (3–3) Hill
Prerequisite: Hist 181–82 or equivalent. (Academic year)

* Offered jointly by the Department of History and the American Studies Program.

283–84 **Research Seminar: Recent U.S. History** (3–3) Hill
Prerequisite: 6 semester hours of 100-level American History courses. (Hist 283—fall)

285–86 **Research Seminar: Early American History, 1607–1828** (3–3) Hill, DePauw
Prerequisite: Hist 170, 175, or 181; or equivalent.

287 **Seminar: Problems in Latin American Civilization** (3) Staff
Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

288 **Research Seminar: History of Chinese Communism** (3) Thornton
Prerequisite: Hist 188 or equivalent. (Spring)

289 **Seminar: Modern Japanese History** (3) Sigur
Research and writing seminar on selected topics in modern Japanese history from the Meiji Restoration of 1868 to the present. (Spring)

291 **Research Seminar: 20th Century History** (3) Sachar
(Formerly Research Seminar: 20th Century Problems—Era of World War I)
(Fall)

292 **Research Seminar: the Palestine Question in Modern History** (3) Sachar
(Formerly Research Seminar: 20th Century Problems—Era of World War II)
(Spring)

293–94 **Research Seminar: the Modern Near East** (3–3) Davison
Prerequisite: Hist 193 or 194 or equivalent. (Hist 294—spring)

295–96 **Research Seminar: the Modern Far East** (3–3) Johnson
Prerequisite: Hist 195–96 or equivalent.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

Prerequisite to all fourth-group History courses: the appropriate second-group preparation and consent of instructor.

Fourth-group History courses are limited to graduate students; but they are primarily for doctoral students.

George Washington University is a member of the Folger Institute of Renaissance and 18th-century Studies. The policies of the Institute are set by a central committee on which each member institution is represented. Doctoral students enrolled in one of the Institute seminars are eligible to apply for fellowship aid, under a grant from the National Endowment for the Humanities. Folger Institute Seminars are numbered 301 through 309. Seminar titles for the 1974 fall semester (301, 305, 307, 309) are listed below. Seminar titles for the 1975 spring semester (302, 304, 306, 308) will be announced. Students wishing to register for these courses should consult the Chairman of the Department of History.

301 **Anglo-Dutch Relations** (3)
(Fall)

305 **"King Lear"** (3)
(Fall)

307 **The English Bible** (3)
(Fall)

309 **Paleography Workshop** (3)
(Fall)

311–12 **Readings in Medieval History** (3–3) Andrews
(Hist 312—spring)

341–42 **Readings in Modern European History** (3–3) Davison
(Hist 342—spring)

345–46 **Readings in Russian History** (3–3) Thompson

351–52 **Readings in English History** (3–3) Schwoerer, Kenny

361–62 **Readings in Latin American History** (3–3) Klarén

371–72 **Readings in American Social History** (3–3) Brown

*373–74 **Readings on the Negro in American Culture** (3–3) Brown
(Academic year 1974–75 and alternate years)

375–76 **Readings in U.S. Political History** (3–3) Haskett
(Hist 376—fall)

†379–80 **Readings in Economic History** (3–3) Sharkey
Hist 379: American economic history. Hist 380: modern European economic history. (Academic year)

381–82 **Readings in American Diplomatic History** (3–3) Staff
(Hist 382—fall)

385–86 **Readings in Early U.S. History** (3–3) DePauw
(Hist 386—fall)

387–88 **Readings in the History of Sino-Soviet Relations** (3–3) Thornton
(Hist 388—fall)

395–96 **Readings in Modern Far Eastern History** (3–3) Johnson

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

* Offered jointly by the Department of History and the American Studies Program.
† An interdepartmental course offered by the departments of History and Economics.

Honors Program—Columbian College

H.E. Yeide, Jr., *Coordinator*

Limited to selected sophomores (see page 70).

FIRST GROUP

1 Seminar: the Great Ideas of the West (3)
Reading, discussion, and research involving works crucial to an understanding of the great Western ideas—their historical development and contemporary relevance. Examination of problems and categories that lie at the roots of most modern scholarly disciplines. (Fall)

21–22 Seminar: Contemporary Problems (3–3)
Reading, discussion, and research dealing with one major contemporary problem each semester, utilizing the perspectives and insights of various academic disciplines. (Academic year)

23 Independent Honors Study (3)
Admission by prior approval of Honors Program Advisory Committee. A major study project supervised by a faculty member. A significant paper or report required. (Spring)

Institute for Sino-Soviet Studies

MEMBERS OF THE INSTITUTE

Gaston J. Sigur (*Director*), C.F. Elliott, S.A. Grant, Andrew Gyorgy, H.C. Hinton, W.R. Johnson, C.A. Linden, F.H. Michael, C.A. Moser, Vladimir Petrov, Chung-wen Shih, R.B. Thompson, Richard Thornton, R.Y.C. Yin

ASSOCIATE MEMBERS OF THE INSTITUTE

Joseph Baclawski, Eleanor Hadley, John Hardt, Tao-tai Hsia, Bernard Ramundo, Philip True, R.K. White, T.W. Wolfe

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The Institute for Sino-Soviet Studies offers specialized graduate study in the School of Public and International Affairs. Students who lack background in Soviet and East Asian studies are required to take undergraduate courses selected by the adviser as prerequisite to graduate work. Related preparatory undergraduate courses include the following: Econ 101, 102, 133, 134, 169, 170; Hist 138, 143, 144, 145, 146, 187, 188, 189, 195–96; P Sc 5, 101, 112, 115, 160, 162, 163, 193, 194; Psyc 151.

For description of the objectives and programs of the Institute, see pages 175–76. For descriptions of the courses listed below, see the appropriate departmental listing.

ECONOMICS

267 *Seminar: Soviet Economy* (3) Hardt
268 *Seminar: Economic Theory and Development in Communist Countries* (3) Hardt

269	*Economy of Communist China I* (3)	Yin
270	*Economy of Communist China II* (3)	Yin
271	*Economy of Japan* (3)	Hadley

GEOGRAPHY AND REGIONAL SCIENCE

265	*Seminar: Geography of the Soviet Union* (3)	Baclawski
266	*Seminar: Geography of China* (3)	True

HISTORY

205–6	*Seminar: Modern History of Eastern Europe* (3–3)	Petrov
207	*Seminar: the Communist Party of the Soviet Union* (3)	Grant
208	*Research Seminar: History of World Communism* (3)	Thornton
214	*Evolution of the Socialist Commonwealth* (3)	Petrov
217–18	*Seminar: Russian and Soviet Thought* (3–3)	Grant
231	*Seminar: Sino-Soviet Relations* (3)	Michael
237	*Seminar: Soviet Foreign Policy, 1917-1953* (3)	Petrov
245	*Research Seminar: Revolutionary History* (3)	Thompson
246	*Research Seminar: Russian History* (3)	Thompson
288	*Research Seminar: History of Chinese Communism* (3)	Thornton
289	*Seminar: Modern Japanese History* (3)	Sigur
295–96	*Research Seminar: the Modern Far East* (3–3)	Johnson
345–46	*Readings in Russian History* (3–3)	Thompson
387–88	*Readings in the History of Sino-Soviet Relations* (3–3)	Thornton
395–96	*Readings in Modern Far Eastern History* (3–3)	Johnson

LAW*

546	*Soviet Law* (2)	Ramundo
547	*Chinese Law* (2)	Hsia

POLITICAL SCIENCE

213–14	*Comparative Communist Systems* (3–3)	Linden
215–16	*Seminar: the Communist Camp in World Politics* (3–3)	Staff
224	*Readings in Socialism and Communism* (3)	Elliott, Linden
227	*Seminar: Governments and Politics of Eastern Europe* (3)	Gyorgy
229	*Readings in Soviet Government and Politics* (3)	Elliott, Linden
231	*Seminar: Sino-Soviet Relations* (3)	Michael
232	*Seminar: International Communications* (3)	Staff
233	*Seminar: Soviet Government and Politics* (3)	Elliott, Linden
253	*Seminar: Chinese Government and Politics* (3)	Michael
254	*Colloquium: East Asia* (3)	Michael
255	*Colloquium: Russia and Eastern Europe* (3)	Gyorgy
257–58	*Seminar: Communism in Developing Countries* (3–3)	Staff
265–66	*Chinese Communist Policy Processes* (3–3)	Hinton
269	*Seminar: Soviet Foreign Policy* (3)	Elliott
270	*Political and Social Institutions of Eastern Europe* (3)	Gyorgy

* Students who elect courses in Law must have the permission of the Dean of the National Law Center. For course descriptions, see the *National Law Center* catalogue.

274 *Principles and Problems of International Political Communication* (3) — Staff
288 *Seminar: Soviet Military Policy and Strategy* (3) — Wolfe
294 *Seminar: Governments and Politics of Japan and Korea* (3) — Staff
295 *Seminar: Chinese Communist Foreign Policy* (3) — Hinton
296 *The Communist Role in Far Eastern International Politics* (3) — Hinton
298 *Southeast Asia in World Politics* (3) — Staff
325 *Research Seminar: Topics in Marxism-Leninism* (3) — Elliott, Linden

PSYCHOLOGY

259 *Seminar: Social Psychology of Communism* (3) — White

International Affairs

See "Public and International Affairs."

Italian

See "Romance Languages and Literatures."

Japanese

See "East Asian Languages and Literatures."

Journalism

Professorial Lecturers F.L. Dennis, H.L. Coppenbarger
Associate Professors R.C. Willson, Philip Robbins (*Chairman*)
Associate Professorial Lecturers Peter Weaver, C.W. Puffenbarger, H.E. Paine, O.L. Mazzatenta, Peter Silberman, D.W. Burkett, R.L. Courage, George Cheely, J.P. McGill, Clare Crawford, Elie Rogers
Assistant Professorial Lecturer R.S. Patton

Bachelor of Arts with a major in Journalism (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students planning to major in Journalism should take Engl 12 rather than Engl 11 in satisfying the English composition requirement.)

2. Prerequisite courses—Engl 51–52 or 71–72; Jour 71–72; P Sc 4 and 6 or 5 and 6.

3. Required courses in the major—24 hours of second-group courses in Journalism, including (a) Jour 111, 196, 198; and (b) 9 semester hours chosen from Jour 121, 125, 133, 135, 137, 138, 139, 151.

4. Required as a minor area of concentration—a minimum of 18 semester hours of second-group courses, chosen in consultation with the major adviser, in one other department of Columbian College of Arts and Sciences. Students electing a minor area in science may fulfill this requirement with courses in more than one department.

Recommended Electives: Econ 121, 142, 161, 162, 181–82; P Sc 103, 104, 121–22, 125, 126, 145, 146; Psyc 115; Sp&D 133, 134, 135–36; Stat 53.

Departmental prerequisite: Jour 111 is prerequisite to Jour 125, 133, 135, 137, 138, 139, 190, and 196.

FIRST GROUP

71–72 **Introduction to Mass Communication** (3–3) Willson

Jour 71: evolution of newspapers and other media in relation to political, social, and economic life; concept of press freedom. Jour 72: mass media, problems of contemporary journalism, emphasis on media-government relations. (Academic year)

SECOND GROUP

111 **Reporting** (3) Robbins

Gathering, evaluating, and writing news. Laboratory fee, $5. (Fall and spring)

115 **Newspaper Editing and Make-up** (3) Coppenbarger

Preparation of news copy, pictures, and other graphic material for publication; evaluation of news; page layouts; newspaper make-up. (Spring)

116 **Magazine Layout and Design** (3) Paine

Layout, typography, and design for magazines, newsletters, house organs, and similar publications for associations, institutions, and industry. (Fall)

117 **Magazine Editing** (3)

The editor's responsibility to publisher and readers. Setting the editorial goals and planning content and production to meet them. Editing copy for general and specialized magazines.

121 **Feature Writing** (3) Willson

Free-lancing magazine articles, materials obtained through independent investigation. (Fall and spring)

125 **Science Writing** (3) Burkett

Writing science news for the mass media. (Spring)

133 **Advanced Reporting: Community News** (3) Puffenbarger

Coverage and writing of local news. (Fall)

135 **Advanced Reporting: Consumer Affairs** (3) Weaver

Specialized training in the consumer news field. (Fall)

137 **Advanced Reporting: National Affairs** (3) Silberman

Coverage and writing of federal government news from the point of view of the press association. (Spring)

138 **Investigative Reporting** (3) Crawford

In-depth reporting in selected areas of political, economic, and social affairs. (Fall)

139 **Advanced Reporting: Radio and Television News** (3) Cheely

Preparing news and public affairs programs for broadcast media. (Spring)

140 **Photojournalism** (3) Mazzatenta, Patton

Photographic techniques affecting publication, illustration and story angle, standards of judgment in selection and use of pictures, captions, editing, technique, cropping for effective reproduction. Laboratory fee, $25. (Fall and spring)

141 **Advanced Photojournalism** (3) Rogers

For advanced photojournalism students who want to master skills in news photography, editing, and layout. Special emphasis on story-telling pictures, picture essays, and photography in the print media. Laboratory fee, $25. Prerequisite: Jour 140 or Art 23–24. (Spring)

145 **Principles and Problems of Public Relations** (3) McGill

Principles, problems, and ethics of public relations for government agencies, commercial establishments, educational and other public institutions. Case histories of successful programs. (Fall)

146 **Government Information** (3) Courage

Growth of information activities in government and the role of the information specialist. Writing and editing for government information operations. (Spring)

150 **News Coverage in Washington** (3) Robbins

A survey of the way news is gathered and reported in the nation's capital by wire services, newspaper bureaus, and the local dailies. Field trips to major news centers; practice coverage.

151 **Editorial Writing** (3) Robbins

Techniques of editorial writing, conducting the editorial page, function of editorials and columns of news commentary in a free press. (Spring)

155 **Critical Writing and Reviewing** (3)

Reviewing and commenting on the arts and entertainment for the mass media.

160 **The New Journalism** (3) Robbins

A survey of the impact of fiction techniques on modern nonfiction reportage. Study of selected writers to identify influences and trends.

190 **Internship in Journalism** (3)

Study of a journalistic medium in action by assignment to a Washington area news office. Admission restricted to senior Journalism majors selected by a departmental committee. (Fall and spring)

*195 **Documentary Photography** (3) Lake and Staff

Social problems, team-taught. Each student will work on projects with

* Interdepartmental course offered by the departments of Journalism and Art.

social dimensions. Laboratory fee, $25. Admission by permission of instructor. Limited enrollment. (Spring)

196 **Senior Project** (3) Staff

Open only to journalism majors. Major journalistic effort undertaken in consultation with a member of the Journalism staff. A written request describing the project must be presented to the staff member for approval, and filed with the student's adviser in the semester before registration. (Fall and spring)

198 **Law of the Press** (3) Dennis

Freedom of the press, censorship, legislative controls, publications as contempt of court, copyright, newsgathering agencies, labor law and the newspaper business, law of libel, privileged matter, fair comment on public characters, right of privacy. (Fall)

Judaic Studies

COMMITTEE ON JUDAIC STUDIES

R.G. Jones (*Chairman*), R.H. Davison, Thelma Z. Lavine, Benjamin Nimer, Bernard Reich, H.M. Sachar, J.E. Ziolkowski

The Columbian College of Arts and Sciences offers an interdisciplinary program in Judaic Studies leading to the degree of Bachelor of Arts. This program is intended for students who wish to investigate the history, language, literature, religious and philosophical thought, and political and social experience of the Jewish people from the perspective of several academic disciplines. (Students who wish to concentrate on the religious aspects of Judaism and its relationship to the other religious traditions of the world may prefer to elect a major in Religion with an emphasis on Judaism (see page 416).)

Bachelor of Arts with a major in Judaic Studies (Interdepartmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Clas 21–22, 23–24; Rel 9, 10, 59–60.
3. Required courses in the major (30 semester hours):
   (a) Clas 103–4; Hist 158; Rel 135, 136, 238.
   (b) 12 semester hours selected from at least 3 of the following departments—Anth 177, 183; Art 112; Hist 109, 110, 193, 194; Phil 111, 112, 113; P Sc 179, 180, 191; Rel 103, 104, 105, 126, 137, 138, 139, 172, 213.

Students applying for the 90-hour degree program in Judaic Studies must, in addition to meeting the general requirements (see page 82), present evidence of exceptional preparation in the field of Judaism, provide strong recommendations from high school teachers and/or counselors, and complete a satisfactory interview with the Committee on Judaic Studies.

Latin

See "Classics."

Latin American Studies

COMMITTEE ON LATIN AMERICAN STUDIES

Marvin Gordon (*Chairman*), T.F. Carroll, R.L. Humphrey, Jr., P.F. Klarén, L.L. Perez, J.W. Robb, F.R. Siegel, K.L. Storrs, George Stuart

Bachelor of Arts with a major in Latin American Studies (Interdepartmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Anth 2, Econ 1–2, P Sc 4 or 5.
3. Required courses in related areas—Span 1–2, 3–4; or equivalent. (Span 9–10 or equivalent is recommended.)
4. Required courses in the major—(a) Anth 184 or 185; Econ 185; Geog 161; Hist 163–64; P Sc 177, 178; and 6 semester hours chosen from Span 151–52, 155–56, 157–58, or other approved courses. (b) 18 semester hours, including an interdisciplinary seminar (287) in one of the following areas: Anthropology, Economics, Geography and Regional Science, Hispanic Literatures, History, or Political Science. The required courses listed in (a) which are in the selected area may be included in computing the required 18 semester hours for (b).

Master of Arts in the field of Latin American Studies.—See the School of Public and International Affairs, pages 170–72, 173.

Candidates for the degree of Doctor of Philosophy may elect Latin American History as an area of specialization in the field of History, Spanish American Literature as an area of specialization in the field of Romance Languages and Literatures, or Politics of Latin America as an area of specialization in the field of Political Science.

COURSES DEALING WITH LATIN AMERICA

Anthropology—170, 172, 184, 185, 262, 268, 272, 287
Economics—185, 233, 234, 287
Geography and Regional Science—127, 161, 261, 287
History—161, 163–64, 165, 166, 261–62, 287, 361–62
Political Science—177, 178, 277–78, 287
Portuguese—31–32
Spanish—91–92, 141, 151–52, 155–56, 157–58, 197–98, 253, 255, 256, 261, 264, 266, 287

Management Science

Professors R.F. Ericson, G.L. Lippitt, D.D. Roman, M.M. Wofsey, Peter [illegible] Vaill, R.H. Walther (*Research*)
Professorial Lecturers C.W. Clewlow, M.H. Schwartz, Charles Laidlaw, Thom[illegible] O'Connor, Grace Hopper
Associate Professors J.F. McCarthy, Jr., T.E. Shaughnessy, R.L. Holland, E[illegible] Winslow (*Chairman*), Jerry Harvey, W.E. Smith, W.W. Hardgrave
Adjunct Associate Professor H.C. Demoody
Assistant Professors Elizabeth Adams, John Lobuts, Jr., D.B. Rasmusse[illegible] J.P. Coyne

Programs of study leading to the degrees of *Bachelor of Business Administration*, *Master of Business Administration*, *Doctor of Business Administration*, and *Doctor of Public Administration* are offered by the School of Government and Business Administration (see pages 130-59).

SECOND GROUP

118 **Introduction to Information Processing** (3) Smith, Coyne

Basic principles, terminology, and methods of computer data processing. Introduction to the use of the computer as a tool through homework assignments illustrating typical problems encountered in business and government data processing. Assignments involve flow charting and computer programming in a higher level language (FORTRAN) and are run on the University's computer and on the School's computer terminals. Laboratory fee, $25. (Fall and spring)

119 **Computer Programming for Information Systems** (3) Smith

COBOL programming for business and government data processing applications. For students already familiar with basic computer concepts, flow charting, and programming. Emphasis on practical computer applications in accounting and management information systems. Prerequisite: Mgt 118 or Stat 97. Laboratory fee, $25. (Fall and spring)

120 **Information Systems Development I** (3) Coyne, Smith, Demoody

Assessment of the systems concept and its relationship to organizational information decision-making and management. Concepts and techniques involved in the initial development of new or revised computer-based information systems, e.g., systems analysis and design phases. Prerequisite: Mgt 118, 119; or permission of instructor. (Fall)

121 **Information Systems Development II** (3) Coyne, Smith, Demoody

A further examination of the information systems development process, including concepts and techniques for assessment, selection, introduction, operation, and maintenance of a newly designed automated information system. Prerequisite: Mgt 120 or permission of instructor. (Spring)

122 **Special Studies in Information Systems** (3) Coyne, Smith, Demoody

An independent or group-study project in information systems development which may involve faculty-supervised research, a case-study project, or field experience as an intern systems analyst in a local public or private organization. Prerequisite: Mgt 121 or permission of instructor. (Fall and spring)

THIRD GROUP

201 **Advanced Administrative Management** (3) Ericson, Eastin, Brown

Principles and practices common to administrative units of all kinds. (Fall and spring)

203 **Mathematics for Management** (3) Holland

Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus, and linear algebra to optimization problems. Prerequisite: algebra. (Fall and spring)

204 **Quantitative Factors in Administration** (3) Rasmussen, Holland

Survey of quantitative techniques used in the solution of management problems. Potentials and limitations of mathematical models and proper areas for their application. Topics include probability, statistical decision theory, linear programming, waiting line, inventory replacement models (Fall and spring)

207 **Human Behavior in Organizations** (3) Lippitt, Winslow, Harvey, Vaill

Individual, group, intergroup, and other human behavior and development; application of social science research to administration. Learning exercises and practical applications emphasized. (Fall and spring)

208 **Current Issues in Organizational Behavior** (3) Winslow

Study of behavioral factors relating to issues such as automation, ethics, interpersonal relations, organizational change, and similar problems. Problems in behavioral science research. Prerequisite: Mgt 207. (Fall and spring)

210 **Behavioral Factors in the Process of Change** (3) Harvey, Vaill

Review of research, theory, and practice related to the process of change. Basic principles of planned change; individual, group, organization, community, and cultural change. Emphasis on the relationship between human behavior research and theory and the change process. Prerequisite: Mgt 207 or permission of instructor. (Fall and spring)

212 **Organizational Development: Concepts and Methods** (3) Lippitt, Vaill

Primarily for doctoral students. Examination of different concepts of organizational structure, processes, and growth. Models of organizational change will be developed with a taxonomy of methods of initiating action to further organizational development. The methods of action, research, team building confrontation methods, objectives analysis, survey research, and structural revision will be related to organizational development processes. Prerequisite: Mgt 210 or equivalent. (Fall)

213 **Consultative Processes in Organizations** (3) Lippitt, Harvey

Primarily for doctoral students. Examination through actual practice as well as theory of the nature of the helping process between one person or group and another person or group. Dynamics of the consulting process will be explored as well as role differences in internal and external consultation. Development of skill in the helping relationship will be furthered within the framework of interpersonal relation concepts and laboratory experiences. Prerequisite: Mgt 210 or equivalent. (Spring

224 **Theory and Management of Systems** (3) Ericson, Adam

Introduction to systems theory and qualitative systems analysis. Analysis of systems in organizations and their impact on management: system point of view, enterprise as a system, effect of technical and management systems on organization structure, information-decision systems, system design, and dynamic aspects of organizational systems. Prerequisite: Mgt 201, 204 or 225 (off campus), 207. (Fall)

225 **Managerial Statistics I** (3) Rasmussen, Hardgrave

The mathematics of probability and statistics and its applications in management science and operations research. Topics include random va

ables; discrete and continuous probability distributions; moments and other descriptive measures; sampling theory; and an introduction to statistical estimation, hypothesis testing, and regression analysis. Prerequisite: Mgt 203 or equivalent. (Fall and spring)

226 **Managerial Statistics II** (3) Rasmussen, Hardgrave

Management applications of the theory and techniques of mathematical statistics. Topics include maximum likelihood and other methods of estimation, hypothesis testing, descriptive measures of bivariate distributions, regression and correlation, analysis of time series, econometric models and multiple regression, statistical decision theory, and the revision of probabilities in decision-making. Prerequisite: Mgt 225. (Fall and spring)

227 **Mathematical Programming: Techniques and Applications** (3) Hardgrave

Technical and management considerations of linear and nonlinear programming. Mathematical and computational aspects of linear programming. Formulation of linear programming models. Studies of applications of linear programming. Introduction to theory and application of nonlinear programming. Prerequisite: Mgt 203 or equivalent. (Fall)

228 **Techniques of Operations Research** (3) Hardgrave

Survey and introduction to contemporary operations research techniques. Analytical methods such as simulation, queuing. Inventory models, dynamic programming, integer programming, and network flows. Prerequisite: Mgt 225, 227.

229 **Seminar: Management Science and Operations Research** (3) Hardgrave

Supervised study in depth and advanced projects in management science and operations research. Prerequisite: Mgt 226, 227; or permission of instructor. (Spring)

230 **Administration of Research and Development** (3) D. Roman

Examination of technological, political, and economic factors affecting the R&D environment; operational aspects; management problems in military, governmental, and industrial organizations; project selection, resource allocation, personnel, planning and control, measurement and evaluation. (Fall)

232 **International Research and Development** (3) D. Roman
(Formerly B Ad 254)

Technological, political, social, and economic factors affecting international R&D policy; problems in industrial, governmental, and international organizations; world technological forecasting; resource allocation; technology transfer. Prerequisite: Mgt 230 or permission of instructor. (Fall)

239 **Seminar: Administration of Research and Development** (3) D. Roman
(Formerly Mgt 231)

Individual and/or group in-depth research projects dealing with various phases of research and development management. Topic will vary each time the course is offered according to the emerging technology, current operational problems, and student interest. Prerequisite: 6 to 9 semester

hours of research and development management or permission of instructor. (Fall)

240 **Survey of Information Technology** (3) — Coyne, Adams, McCarthy, Smith

A management-oriented presentation of the vocabulary, concepts, and trends in computer hardware and software, information systems design and development, organizational impact, and effective management; milestones of past and current research; computer technology as a rapidly evolving force of major significance in business, government, and industry. Designed for students without prior information technology experience who do not plan to take additional information technology courses. Laboratory fee, $25. (Fall and spring)

241 **Management Information Systems Development and Application** (3) — McCarthy

Contemporary theories and practices in the development of management information systems. Participation in the design of information systems specifications. The roles of both management and systems design personnel in the systems development process studied and evaluated. Impact of management information systems upon the organization and its decision-making processes evaluated. Case studies. Prerequisite: an introductory course in information technology, or permission of instructor. (Fall)

242 **Comparative Computer Systems** (3) — Wofsey, McCarthy

Characteristics and capacities of the range of information processing equipment in use today. Recent and prospective equipment and software development. Selection of computers and related software and equipment. Prerequisite: Mgt 241 or permission of instructor. (Spring)

243 **Management of Information Technology** (3) — Adams, Coyne

Advanced course; emphasis on principles, practices, and trends in the management of information technology. Topics include the role and control of an information processing installation; trends, new hardware, and advanced technology in the computing milieu and their implications for information processing management; an analysis of the performance of the data processing activity internally and externally, according to developed criteria. Case studies. Prerequisite: Mgt 241, 242; or permission of instructor. (Fall)

244 **Information Systems and Telecommunication** (3) — McCarthy, Schwartz

Study of the growing linkages among the technology of information processing, information transmission, and organization management—computers, communications, and managers—from two points of view (1) new potentials for improved management, and (2) solving communications-related problems of informations systems design, implementation and operation. Admission by permission of instructor. (Fall)

245 **Data Base Management** (3) — Smith, Coyne

An in-depth approach to the understanding and use of the latest techniques for developing and implementing an effective data base system. Topics include data base organization, creation, and maintenance; effort and economic justification; evaluation criteria; standardization of data base systems; impact of packaged data management systems; and an analysis of

the current state-of-the-art in data base development. Prerequisite: Mgt 119, 241. Laboratory fee, $25. (Spring)

249 **Seminar: Information Technology** (3) Wofsey

Current problems in the design and implementation of computer-supported systems; emphasis on current state-of-the-art through discussion with leading experts in the field, analysis of literature. Prerequisite: Mgt 241, 242, 243; or permission of instructor. (Fall and spring)

262 **Seminar: Contemporary Administrative Theory** (3) Ericson, Adams

Primarily for doctoral students. Current and prospective theory and practice from an inter- and trans-disciplinary viewpoint. Topics include general systems theory, game theory, axiology and management values, antithetics, value engineering, cybernetic systems, decision theory, innovation and creativity models, and general semantics. Prerequisite: Mgt 201, 204, 207, 224. (Fall and spring)

290 **Directed Readings and Research** (3) Staff

(Fall and spring)

295 **Research Methods** (3) Staff

Research techniques, sources of information, array and analysis of data, interpretation and presentation of the findings. (Fall and spring)

299 **Thesis Seminar** (3) Staff

(Fall and spring)

300 **Thesis Research** (3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to doctoral students preparing for the general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to doctoral candidates. May be repeated for credit. (Fall and spring)

Mathematics

Professors David Nelson, T.P.G. Liverman (*Chairman*), Hewitt Kenyon, Choy-Tak Taam
Professorial Lecturers D.M. Dribin, John Wilkes
Associate Professors W.A. Smith, Dagmar Henney, Irving Katz, I.I. Glick, M.D. Green, Ruth Bari, Myrna Lee
Associate Professorial Lecturers S.L. Brodsky, Mabel Morris
Assistant Professors E.A. Stone, H.D. Junghenn

Bachelor of Arts or *Bachelor of Science with a major in Mathematics (Departmental).*—The following requirements must be fulfilled.

1. The general requirements as stated on pages 73, 80–86.

2. Prerequisite courses—Math 31, 32, 33 (Math 30, a prerequisite to Math 31, may be waived upon examination before registration).

3. Required courses in the major—a minimum of 24 semester hours of second-group courses in Mathematics, including Math 106, 121, 123, 139, and 140. It is also strongly recommended that students take French, German, or Russian, and mathematically related courses in such subjects as Physics, Statistics, Economics, and Engineering.

Bachelor of Arts or *Bachelor of Science with a major in Applied Mathematics (Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.

2. Prerequisite courses—Math 31, 32, 33. (Math 30, a prerequisite to Math 31, may be waived upon examination before registration).

3. Required courses in related areas:

(a) Stat 189–90.

(b) Eighteen semester hours to be selected, in consultation with the adviser, from the following Areas of Application. At least 12 semester hours must be chosen from one Area, and the other 6 semester hours must be chosen from courses numbered 101 or higher. For courses in Applied Science, Civil Engineering, Electrical Engineering and Computer Science, Engineering Administration, Mechanical Engineering, and Operations Research, see the *School of Engineering and Applied Science* catalogue.

Area I. Social and Management Sciences—courses chosen from Ap S 115, CE 183, 197; Econ 1–2, 101, 102, 123, 199; E Ad 261, 269, 281–82, 283, 284; EE 184, 283, 284, 285; Math 101, 102, 113, 124; OR 201, 209, 251, 252, 261, 277, 279, 281, 291; Stat 113, 117, 118, 131, 157–58, 159, 161–62, 165–66, 188, 197.

Area II. Engineering and Physical Sciences—courses chosen from Chem 111–12, 113; CE 120, 123, 140, 166, 167, 168, 185, 186, 190, 191, 192, 193, 198, 201, 202, 203, 204, 205, 206, 207, 210, 220, 223, 252, 254, 258, 261, 262, 263, 275; Stat 107, 117, 118, 131, 157–58, 159, 161–62, 197; and any course offering in Electrical Engineering and Computer Science, Mechanical Engineering, or Physics.

Area III. Computer Sciences—courses chosen from EE 152, 153, 154, 157, 158; Math 102, 113, 124, 142, 153, 154, 157; Stat 113, 157–58, 161–62, 165–66, 197.

4. Required courses in the major—a minimum of 24 semester hours of second-group courses in Mathematics, including Math 111, 112, 139, 140, 181–82. It is also strongly recommended that students take French, German, or Russian.

Master of Arts in the field of Mathematics.—Prerequisite: a Bachelor's degree with a major in Mathematics from this University, or an equivalent degree.

Required: the general requirements, pages 90–97. Students must complete 30 semester hours of approved course work with or without a thesis.

Master of Arts or Master of Science in the field of Applied Mathematics.—Prerequisite: a Bachelor's degree with a major in Mathematics or a related field such as Statistics, a physical science, Engineering, or Economics.

Required: the general requirements, pages 90–97. Course work is divided between Mathematics courses and courses from one Area of Application—Economics, Engineering (Civil, Computer Science, Electrical, Engineering Administration, Mechanical, or Operations Research), Physics, Statistics, Urban and Regional Planning. Courses in the chosen Area of Application are selected in consultation with the relevant department.

Candidates for the degree of *Master of Arts* must complete 30 semester hours of approved course work, including Math 299–300 *Thesis Research*. At least 15 semester hours must be in Mathematics courses, with no more than 3 of these from second-group courses. The remaining courses are chosen from the selected Area of

Application. Theses are jointly supervised by the Department of Mathematics and the department concerned with the Area of Application.

Candidates for the degree of *Master of Science* must complete 30 semester hours of course work; at least 15 of these must be in Mathematics courses, with no more than 6 semester hours from second-group courses. There is no thesis requirement.

Master of Science for Teachers—Prerequisite: A Bachelor's degree; at least 12 semester hours or equivalent in Mathematics courses, including the equivalent of Math 31; experience in teaching mathematics at the secondary school level.

Required: 30 semester hours of approved second- or third-group Mathematics courses, including Math 168.

Doctor of Philosophy in the field of Mathematics.—Required: the general requirements, pages 90–94, 97–99. The Department doctoral program committee, after consultation with the student, will stipulate (1) courses which must be taken to fulfill the 48-semester-hour requirement leading to the General Examination; (2) the two languages, selected from French, German, and Russian, which must satisfy the foreign language requirement; and (3) the four areas of study in which the student must prepare for the General Examination. The doctoral program committee will appoint a Director of Research when the student has selected (preferably early in his program) one of the following research fields for his dissertation: Functional Analysis (Abstract Differential Equations, Functional Equations, Generalized Functions, Groups of Operators), Group Representations, Linear Algebra (Matrix Theory), Logic, Measure and Integration, Ordinary and Partial Differential Equations, Theory of Numbers, and Topology (General Topology, Analytic Topology, Topological Groups).

Bachelor of Arts in Education with a teaching field in Mathematics.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Mathematics option and the professional courses listed on pages 113, 117.

FIRST GROUP

3 College Algebra (3) — Morris and Staff

Equivalent to the standard two years of high school algebra with several additional topics. Prerequisite: one year each of high school algebra and high school geometry. (Fall and spring)

6 Plane Trigonometry (3) — Morris and Staff

Prerequisite: two years of high school algebra and one year of high school geometry, or Math 3 (or concurrent registration therefor). (Fall and spring)

9 General Mathematics I (3) — Smith and Staff

For students electing Math 9 and 19 as a terminal sequence. Logic, sets, number systems. Prerequisite: two years of high school mathematics. (Fall and spring)

10 General Mathematics II (3) — Smith and Staff

Mathematical systems, geometry, and introduction to statistics and probability. Prerequisite: Math 9. (Fall and spring)

30 Precalculus (3) — Bari and Staff

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school al-

gebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students must take a placement examination in algebra and trigonometry. (Fall and spring)

31 **Calculus of One Variable** (3) Green and Staff

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent.* (Fall and spring)

32 **Calculus of Several Variables** (3) Green and Staff

Vectors, determinants, partial derivatives, multiple integrals, curves. Prerequisite: Math 31. (Fall and spring)

33 **Calculus of Vector Functions** (3) Green and Staff

Differential equations, infinite series, vector calculus, line integrals, Green and Stokes theorems. Prerequisite: Math 32. (Fall and spring)

51 **Mathematics for the Social and Management Sciences I** (3) Glick and Staff

Notion of function, graph of function; sequences; differential and integral calculus of functions of one variable; exponential and logarithmic functions. New students must take a placement examination in algebra prior to registration. (Fall and spring)

52 **Mathematics for the Social and Management Sciences II** (3) Glick and Staff

Functions of several variables; partial derivatives, maxima and minima, Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51. (Fall and spring)

SECOND GROUP

101 **Introduction to Mathematical Logic** (3) Nelson

Introduction to proof theory and model theory of propositional and predicate calculi, computability, topics from foundations of mathematics. Open to sophomores with permission of Department. Prerequisite: Math 32 or permission of instructor. (Fall)

102 **Axiomatic Set Theory** (3) Nelson

Zermelo-Fraenkel set theory, ordinals and cardinals, foundations of the real number system. Prerequisite: Math 101 or permission of instructor. (Spring 1976 and alternate springs)

103 **Foundation of Mathematics for the Nonmathematician** (3) Nelson

A popular approach. Set-theoretic foundations of mathematics; constructivism, finitary and intuitionistic mathematics, computability and decidability; Turing machines and the Goedel theorems; the paradoxes; nonclassical systems of logic. Prerequisite: two years of high school mathematics.

* Math 30 may be waived as a prerequisite by examination on scheduled dates.

104 **Mathematics and Human Thought** (3) Dribin

Philosophical and historical aspects of mathematics and its interplay with other disciplines from antiquity to modern times. Prerequisite: two years of high school mathematics. (Spring 1976 and alternate springs)

106 **Introduction to Topology** (3) Green

Prerequisite: Math 139 or permission of instructor. (Spring)

107 **Introduction to Algebraic Topology** (3) Bari

Prerequisite: Math 122 and 139, or permission of instructor. (Fall 1976 and alternate falls)

111 **Mathematics for Engineers and Physicists I** (3) Liverman and Staff

Differential equations, linear algebra, Fourier series and integral, differential equations of the first order. Prerequisite: Math 32.

112 **Mathematics for Engineers and Physicists II** (3) Liverman and Staff

Ordinary differential equations, systems of differential equations, boundary-value problems, partial differential equations. Prerequisite: Math 111.

113 **Graph Theory** (3) Bari and Staff

Directed and undirected graphs; bridges, cutpoints, and blocks; connectivity; partitions; Eulerian and Hamiltonian graphs; planarity; coloring problems. Prerequisite: Math 32.

121–22 **Introduction to Abstract Algebra** (3–3) Lee and Staff

Selected topics in elementary number theory, groups, rings (including polynomial rings), and fields. Open to sophomores with permission of Department. Prerequisite: Math 32 or permission of instructor. (Academic year)

123 **Linear Algebra** (3) Lee and Staff

Theory of vector spaces, linear transformations, and matrices. Quadratic and bilinear forms, spectral decomposition. Prerequisite: Math 121. (Fall)

124 **Introduction to Matrix Theory** (3) Liverman

Operations on matrices, linear equations, matrix inversion, vector spaces, characteristic roots and vectors, spectral theorem, quadratic forms. Prerequisite: Math 31 or 52. (Fall and spring)

134 **Introduction to Boundary-value Problems** (3) Staff

Prerequisite: Math 111 or 142. (Spring 1975 and alternate springs)

135 **Projective Geometry** (3) Dribin

Prerequisite: Math 123 or 124, or equivalent. (Fall 1975 and alternate falls)

139 **Advanced Calculus I** (3) Taam

Review and extension of elementary one-variable calculus, emphasis on the theoretical foundations; differential calculus of several variables. Prerequisite: Math 33. (Fall and spring)

140 **Advanced Calculus II** (3) Taam

Differential and integral calculus of several variables; contraction maps,

implicit function and differential equation theorems. Prerequisite: Math 139 or equivalent. (Spring)

141 **Advanced Calculus III** (3) Glick

Tensors, differential forms, Stokes theorem, introductory differential geometry. Prerequisite: Math 140. (Spring)

142 **Theory of Differential Equations** (3) Taam

Prerequisite: Math 139. (Fall)

153 **Introduction to Numerical Analysis** (3) Brodsky

Introduction to fundamentals of numerical analysis using modern digital computers. Solution of linear systems and of ordinary differential equations. Interpolation polynomials. Iterative solution of nonlinear equations. Simple quadrature techniques. Prerequisite: Math 111 or 139, or equivalent. (Fall 1974 and alternate falls)

154 **Difference Equations** (3) Brodsky

Introduction to finite differences equations and their solution. Physical examples and analogies with differential equations are employed to motivate and apply the techniques developed. Generating functions. Analysis of error and stability characteristics. Prerequisite: Math 111 or 139, or equivalent. (Spring 1975 and alternate springs)

157 **Introduction to Complex Variable Theory** (3) Henney and Staff

Prerequisite: Math 139. (Spring)

*160 **Introduction to Abstract Algebra for Teachers** (3) Bari and Staff

Basic algebraic structures, such as groups, rings, integral domains, and fields; properties of integers and rational numbers. Prerequisite: Math 31 or equivalent.

*161 **Introduction to Linear Algebra for Teachers** (3) Bari and Staff

Linear functions, solution of equations, quadratic forms, change of basis. Prerequisite: Math 31 or equivalent.

*162 **Introduction to Geometric Theories for Teachers** (3) Bari and Staff

Postulational developments of Euclidean and non-Euclidean geometries. Prerequisite: Math 31 or equivalent.

*163 **Advanced Calculus for Teachers** (3) Bari and Staff

Rigorous re-examination of one-variable calculus, emphasis on limit, continuity, differentiability, Riemann integration. Prerequisite: Math 160 or permission of instructor.

*164 **Foundations of Mathematics for Teachers** (3) Bari and Staff

Logic, set-theory, and foundations of the real number system. Prerequisite: Math 31 or equivalent.

*165 **Introduction to Theory of Numbers for Teachers** (3) Bari and Staff

Selected topics from theory of numbers. Prerequisite: Math 31 or equivalent.

* Open only to candidates for the degree of Master of Science for Teachers, teachers for in-service training, or students recommended by the Department of Education.

*166 **Introduction to Graph Theory for Teachers** (3) Bari and Staff

Graph theory with applications to matchings, networks, programming, economics, psychology, biology, puzzles. Prerequisite: Math 31 or equivalent.

*167 **Introduction to Topology for Teachers** (3) Bari and Staff

Elements of topology with some simple applications. Prerequisite: Math 163 or permission of instructor.

*168 **Seminar: Curriculum Studies** (3) Bari and Staff

Critical examination of secondary school mathematics curricula, techniques, and programs. Prerequisite: Math 31 and permission of instructor.

*169 **Proseminar in Mathematics for Teachers** (3) Bari and Staff

Topics in mathematics; emphasis on directed individual research. Prerequisite: Math 31 and permission of instructor.

181–82 **Seminar: Applied Mathematics** (3–3) Glick

Prerequisite: Math 140, Stat 189–90, some knowledge of linear algebra, senior status as major in Applied Mathematics. (Academic year 1975–76 and alternate years)

191 **Special Topics** (arr.) Staff

Admission by permission of instructor. May be repeated for credit. (Fall or spring)

195 **Reading and Research** (arr.) Staff

Under the personal direction of an instructor. Limited to Mathematics and Applied Mathematics majors with demonstrated capacity. Prior approval of instructor required. May be repeated for credit. (Fall or spring)

THIRD GROUP

Requirements for graduate degrees in Mathematics at George Washington University are described on pages 344-45. Courses in Mathematics for the fulfillment of these requirements are given jointly by Catholic University of America, George Washington University, and Georgetown University each year at one location (1974-75—Catholic University of America; 1975-76—Georgetown University; 1976-77—George Washington University).

Courses marked with an asterisk (*) are offered every year.

1974-75 TEACHING STAFF FROM COOPERATING UNIVERSITIES

Catholic University of America

Professors Witold Bogdanowicz, Parfeny P. Saworotnow
Associate Professors Gustav B. Hensel, John N. Welch
Assistant Professors Charles Byrne, Leonard J. Gallagher, Daniel Gallo, James N. Hagler, Francis E. Sullivan

* Open only to candidates for the degree of Master of Science for Teachers, teachers for in-service training, or students recommended by the Department of Education.

Georgetown University

Professors John Lagnese, Herbert Maisel, Arnold P. Stokes
Associate Professors E. Ray Bobo, Richard F. Datko, J. Roger Teller
Assistant Professors George Benke, Giuliano Gnugnoli, Bruce Orcutt, Ronald Rosier, Allen B. Tucker

ALGEBRA

Teller

*201 **Graduate Algebra I** (3)

Groups, including Sylow theorems, direct decomposition of finitely generated Abelian groups, solvable nilpotent and simple groups, free groups. (Fall)

Teller

*202 **Graduate Algebra II** (3)

Rings, including prime and maximal ideals, Euclidean and unique factorization domains, polynomial rings; modules over rings, including tensor product; semi-simple rings and algebras, including the Wedderburn theorem; Noetherian rings, including primary decomposition theorem. Prerequisite: Math 201 or permission of instructor. (Spring)

Lee

203 **Graduate Algebra III** (3)

Fields, including Galois theory, valuation theory. Prerequisite: Math 202 or permission of instructor. (Fall)

Lee

204 **Rings and Homology** (3)

Prerequisite: Math 202 or permission of instructor. (Spring)

205 **Homological Algebra and Category Theory** (3)

Categories, functors, natural transformations; examples; functor categories, quotient categories; universal arrows, limits; adjoint functors, monads (triples); Abelian categories; imbedding theorems; modules, projective and injective; extensions and satellites, Ext and Tor. Prerequisite: Math 202 or permission of instructor.

206–7 **Quadratic Forms I–II** (3–3)

Prerequisite: undergraduate course in linear algebra.

208 **Combinatorics** (3)

Prerequisite: undergraduate modern algebra and linear algebra.

209–10 **Representations of Groups I–II** (3–3)

Prerequisite: Math 202 or permission of instructor.

211 **Group Theory I** (3)

Prerequisite: Math 201.

212 **Group Theory II** (3)

Prerequisite: Math 211.

213 **Nonassociative Algebras** (3)

Lie and Jordan algebra. Prerequisite: Math 202.

214 **Algebraic Number Theory** (3)

Prerequisite: Math 203 or permission of instructor.

215 **Topics in Algebra** (3)

216 **Graph Theory** (3)

Selected topics in graph theory from introductory topics to problems currently of research interest.

ANALYSIS

*220 **Introduction to Modern Analysis** (3) Gallo

Real numbers, least upper bounds, completeness, Bolzano-Weierstrass theorem; Banach spaces, examples: R^n, C [a, b], l_1, l_2. Hilbert spaces; limits of real and vector sequences, limits of real and vector functions, all basic properties of real and vector continuous functions, differentiation and integration of real and vector functions, basic properties of compact sets, closed and open sets, linear transformations on R^n to R^m, fixed-point theorem and applications to differential and integral equations, Fourier series, Stone-Weierstrass theorem. (Fall)

*221 **Introduction to Complex Analysis** (3) Byrne

Algebra, geometry, and topology of complex numbers; definitions and properties of elementary functions, e.g., e^z, sin z, log z; integrals, functions defined by integrals; Cauchy's theorem and formula, integral representation of derivatives of all orders; maximum modulus, Liouville's theorem, fundamental theorem of algebra; Taylor and Laurent series; uniform convergence, term-by-term differentiation; domain of convergence and classification of singularities; contour integration; the residue theorem; evaluation of integrals involving single-valued functions; analytic continuation, multivalued functions, and branch points; technique for contour integrals involving multivalued functions. Prerequisite: Math 220 or equivalent. (Spring)

222 **Applications of Complex Analysis** (3)

Potential theory and conformal mapping. Special functions. Asymptotic expansions; steepest descent, stationary phase, and WKB methods. Fourier and Laplace transforms, applications to partial differential equations. Wiener-Hopf method, dual and singular integral equations. Prerequisite: Math 221 or an undergraduate course in complex variables.

223 **Advanced Complex Analysis** (3) Glick

Harmonic functions, partial fractions, Mittag-Leffler theorem; infinite products, entire functions, the Hadamard product theorem, the gamma function, representations of the gamma function; Hurwitz's theorem, normal families of functions, Montel's theorem, the Riemann mapping theorem, elementary conformal mapping; analytic continuation, the monodromy theorem, branch points, Riemann surfaces. Prerequisite: Math 221 or equivalent. (Fall)

*224 **Measure and Integration Theory** (3) Datko

Lebesgue integration over the space of reals; the basic convergence theorems, including monotone and dominated convergence theorems; measurability; almost everywhere differentiability of monotone functions; absolute continuity; the L_p spaces and orthogonal expansions; duality of L_p and L_q spaces; orthonormal systems in L_2 (a, b); integration over the space R^n; theorems of Fubini and Tonelli. Prerequisite: Math 220 or equivalent. (Fall)

*225 **Introduction to Functional Analysis** (3) Hagler

Topological and metric spaces; compact spaces and Tychonoff theorem; complete metric spaces and completion of a metric space; Normed and Banach spaces; linear functions; Hahn-Banach theorem; principle of uniform boundedness and applications; elementary introduction to distribution theory; linear operators; the closed-graph theorem and interior mapping principle; Hilbert spaces; inner product, orthogonality, and orthonormal systems; eigenvalues, eigenvectors, invariant subspaces, and projection operators; operational calculus of functions defined on the spectrum. Prerequisite: Math 220 or equivalent. (Fall)

*226 **Banach Algebras and Spectral Theory of Operators** (3) Hagler

Gelfand theory of commutative Banach algebras; function algebras, Stone Čech compactification; application to the spectral theory of operators, spectrol theorem for bounded and unbounded operators; Jacobson radical for arbitrary Banach algebras; H*-algebras and Hilbert modules; related topics. Prerequisite: knowledge of measure and integration, introduction to functional analysis, and Tychonoff and Stone-Weierstrass theorems. (Spring)

227 **Fourier Analysis on Locally Compact Groups** (3)

Elementary properties of topological groups, existence of Haar measure, modular functions, group algebras; application of Gelfand theory to the group algebra; applications to classical theory of Fourier series and integrals; compact and discrete groups, Plancherel and Pontryagin theorems; positive definite functions and positive linear functionals, Stone and Bochner theorems; representations of a compact group G; H*-algebra valued positive definite functions, generalization of Stone and Bochner theorems, their application to multivariate and infinite dimensional stationary processes; related topics. Prerequisite: knowledge of topological groups, measure and integration, and introduction to functional analysis, and some familiarity with Gelfand theory.

228 **Theory of Generalized Functions and Distributions** (3)

Fréchet and countable union spaces; definition, structure, and properties of Schwartz distributions and generalized functions; applications to explicit solutions and existence theory of ordinary and partial differential equations, nested Hilbert spaces; generalized Fourier transform. Prerequisite: Math 220 or permission of instructor.

229 **Ergodic Theory** (3)

Topics selected to serve research interests of instructor and students; emphasis on recent developments and applications to dynamical systems and Markov processes. Prerequisite: Math 224, 225; or permission of instructor.

230 **Differential Equations in Banach Space** (3)

General theory of linear and nonlinear differential equations in Banach space; periodic and almost periodic solutions; stability of solutions. Prerequisite: Math 225 or permission of instructor.

231 **Semi-groups of Operators and Almost Periodic Functions** (3)

Almost periodic functions on the real line and on groups; general theory of weakly almost periodic semi-groups of operators, their asymptotic behavior and convergence into almost periodic groups of operators. Prerequisite: Math 224, 225, 226; or permission of instructor.

232 **Seminar: Functional Analysis** (3) Staff

Topic selected to serve research interests of instructor and students; qualified students encouraged to work on research projects. Admission by permission of instructor. (Spring)

233 **Foundations of Probability Theory and Statistics** (3) Bogdanowicz

Review of the basic concepts of measure and integration theory; probability and expectation; random variable, random process; distribution function and Kolmogorov consistency theorem; characteristic function of a random variable; distributions of Bernoulli, Poisson, Gauss, Polya, Cauchy, Laplace; applications; stochastic independence; Kolmogorov's strong law of large numbers; central limit theorem; applications to statistics. (Fall)

234 **Introduction to the Theory of Random Processes** (3) Bogdanowicz

Stochastic dependence, conditional expectation, limit theorem for submartingales; Markov process; theory of Markov chains; Poisson's process; process of birth and death; Kolmogorov-Chapman equations; second-order stationary random processes; filtering and prediction; Wiener-Hopf equation and its solution; second-order discrete stationary random processes. Prerequisite: Math 233. (Spring)

*235 **Linear Algebra** (3) Orcutt

Vector spaces, affine spaces; linear transformations, invariant subspaces; matrices, determinants, tensor products; inner-product spaces, orthogonality; linear functionals, dual spaces, adjoint transformations; spectral theorem; quadratic forms; Hilbert spaces. (Fall)

APPLIED MATHEMATICS

*240 **Introduction to Ordinary Differential Equations** (3) Junghenn

First course in ordinary differential equations; existence and uniqueness of solutions; continuity of solutions with respect to initial conditions; properties of linear systems. Prerequisite: advanced calculus. (Fall)

241 **Stability Theory of Ordinary Differential Equations** (3)

Introduction to basic notions of stability and asymptotic stability; Liapounov's functions used to establish stability or instability; converse theorems of Liapounov's direct method; comparison theorems, differential inequalities. Prerequisite: Math 240 or permission of instructor.

242 **Theory of Dynamical Systems** (3)

Basic properties of dynamical systems; α and ω limits sets, recurrent motions, minimal sets; ergodic motions, ergodic theorems of Birkhoff and Von Neumann. Prerequisite: Math 240 or permission of instructor.

243 **Theory of Nonlinear Oscillations** (3)

Existence and stability of periodic solutions of ordinary differential equations; derivation of bifurcation equation for weakly nonlinear systems; introduction to the method of averaging, the existence and stability of almost periodic solutions and integral manifolds. Prerequisite: Math 240 or permission of instructor.

244 **Theory of Differential Equations with Delays** (3) Stokes

Basic theory of functional differential equations (differential-difference

equations, equations with delay); theory of linear systems, constant or periodic coefficients; stability theory, Liapounov functionals; existence and stability of periodic and almost periodic solutions. Prerequisite: Math 240 or permission of instructor. (Spring)

245 **Eigenvalue and Boundary-value Problems** (3) Welch

Normed spaces, integral equations, spectral theory of compact operators; application to boundary and eigenvalue problems of ordinary differential equations. Prerequisite: advanced calculus. (Spring)

246 **Numerical Methods in Ordinary Differential Equations** (3) Lagnese

Finite difference methods for initial-value and boundary-value problems; error analysis, analysis of stable schemes; Galerkin's method, with estimation of error in eigenvalue problems. Prerequisite: Math 240 or permission of instructor. (Spring)

247 **Control Theory of Ordinary Differential Equations** (3)

Optimal control of linear systems, control of linear systems with convex cost functionals, the maximal principle and selected topics on control systems.

248 **Fourier Analysis and Integral Transforms** (3)

Fourier series, Fourier integral in one and several variables, Fourier-Stieljes transform, inversion of Fourier transforms, Tauberian theorems, bilateral Laplace transform and applications. Prerequisite: advanced calculus, knowledge of Lebesgue integration, acquaintance with the elementary parts of the theory of functions of a complex variable.

249 **Differential Games** (3)

The idea of a differential game. Examples, discrete games, procedures for solving certain types of games, and the study of surfaces involved in solving differential games.

250 **Calculus of Variations** (3) Byrne

Introduction to the calculus of variations via the notion of the Frechet derivative, the Euler equations, the Hamilton-Jacobi equations; sufficient conditions for a solution to exist, applications to mechanics and physics. (Fall)

251 **Partial Differential Equations with Applications to Mathematical Physics I** (3)

Study of elliptic, hyperbolic, and parabolic partial differential equations; applications to some classical problems of mathematical physics.

252 **Partial Differential Equations with Applications to Mathematical Physics II** (3)

253–54 **Introduction to Numerical Analysis I–II** (3–3)

Elements of theory and practice of numerical analysis using modern digital computers; solution of linear systems and nonlinear equations; computation of eigenvalues and eigenvectors; basic approximation theory; interpotation techniques; numerical quadrature; solution of differential equations. Prerequisite: advanced calculus.

255 **Introduction to Generalized Functions and Fourier Transforms** (3)

Sequential definition of generalized functions—operational solution of

differential equations and systems. Generalized function Fourier series, generalized function Fourier and Laplace transforms, applications to initial and boundary-value problems. Prerequisite: Math 220 or advanced calculus.

256 **Integral Equations** (3)

Volterra linear integral equations of first and second kind with applications to linear ordinary differential equations; Fredholm linear integral equations of first and second kind, applications to Sturm-Liouville problems; some singular or nonlinear integral equations.

257 **Control Theory of Partial Differential Equations** (3) Datko

Minimization of functionals and boundary-value problems; control of systems governed by elliptic partial differential equations; control of systems governed by parabolic partial differential equations; control of systems governed by hyperbolic partial differential equations; regularization, approximation, and penalization. (Spring)

258 **Numerical Methods of Partial Differential Equations** (3) Lagnese

Numerical treatment of the typical initial and boundary-value problems for hyperbolic, parabolic, and elliptic equations of mathematical physics; finite difference schemes, solutions, convergence to solutions of partial differential equations; stability, error analysis, suitability of methods for practical use in digital computers. (Fall)

259 **Selected Topics in Partial Differential Equations I** (3)

260 **Selected Topics in Partial Differential Equations II** (3)

261 **Applied Linear Algebra** (3)

Application of linear algebra to problems occuring in ordinary differential equations, stochastic processes, control theory, and the social and life sciences.

262 **Convex Sets with Applications** (3)

Study of convexity and its application to linear programming.

264 **Approximation and Curve Fitting** (3) Sullivan

General introduction to theory and computational methods of linear approximation; emphasis on least squares and uniform approximation, including discussion of computer implementation of widely used algorithms; programming assignments dealing with typical applications. Prerequisite: advanced calculus. (Spring)

265 **Computational Methods for Nonlinear Problems** (3) Sullivan

Topics in the area of optimization and function minimization; emphasis on analytic and computational aspects of nonlinear iterative methods and their applications to various physical problems; programming assignments dealing with typical applications. Prerequisite: advanced calculus. (Fall)

COMPUTER SCIENCE

270–71 **Simulation of Discrete Stochastic Systems I–II** (3–3) Maisel

Introduction and definition of simulation system, discrete and continuous, stochastic and deterministic, critical event and time-slice; general outline of a simulation, how it is used and how it functions; procedure for de-

veloping a simulation; statistical topics; generating random numbers. Simulation programming and languages, simulating the passage of time and arrivals, FORTRAN, queues and list processing, PL/1, SIMSCRIPT, GPSS, general remarks; GPSS, basic concepts; simulation of computer systems; case study. Prerequisite: knowledge of computers and statistics. (Academic year)

272 **File and Data Management and Information Processing** (3)

External data structures, graph theory, paths, chains, trees, lists, sublists, multilinked lists, directories; basic structure-processing operations, creation, updating, sorting, merging, searching linkage, hashing, Boolean searches; storage media and input/output devices; software; introduction to file organizations; consecutively organized files; keyed files; file arrangement and application; introduction to the processing, storage, and retrieval of data, emphasis on computer techniques. Prerequisite: introduction to data structures and PL/1 programming.

273 **Theory of Formal Languages and Applications** (3)

Introduction to formal languages and their related automata, applications in compiler design. Regular, context-free, context-sensitive, and unrestricted grammars; finite and pushdown store automata; Turing machines; the halting problem; formal description of programming languages' syntax and semantics; syntax-directed compiling techniques; compiler-compilers; additional topics in compiler construction. Prerequisite: introductory computer course; course in abstract algebra is recommended.

LOGIC

*278 **Introduction to Mathematical Logic** (3) Hensel

Propositional and predicate calculus (first order): syntax, formation rules, semantics, axioms, proof and deduction, object vs. metalanguage, deduction theorem, compactness theorem, Godel-Henkin completeness theorem, Craig's interpolation theorem, Beth's definability theorem. First-order recursive arithmetic: incompleteness and undecidability. (Fall)

279 **Model Theory** (3)

Prerequisite: Math 278 or permission of instructor.

280 **Proof Theory** (3) Nelson

Prerequisite: Math 278 or permission of instructor. (Spring)

281 **Computability and Decidability** (3)

Prerequisite: Math 278 or permission of instructor.

282 **Set Theory** (3)

Prerequisite: Math 278 or permission of instructor.

TOPOLOGY

285–86 **General Topology I–II** (3–3) Kenyon

General topological spaces, continuity, quotient spaces, product spaces, filters, nets, separation axioms, compactness and connectedness (global and local). Metrization, compactification, uniform spaces, uniform continuity, complete spaces, and topological groups. (Academic year)

287–88 **Topological Vector Spaces I–II** (3–3) Rosier

Topological vector spaces, vector space topologies, linear manifolds, metrizability and complexification. Locally convex topological vector spaces, Hahn-Banach theorem, projective and inductive topologies, barreled and bornological spaces. Linear mappings, Banach's homomorphism theorem, equicontinuity; uniform boundedness and the Banach-Steinhaus theorem. Tensor products, nuclear mappings and spaces. Duality; dual systems and weak topologies; Mackey-Arens theorem; strong dual, bidual, and reflexive spaces; theorems of Grothendieck, Banach-Dieudonne, and Krein-Smulian; open mappings and closed graph theorems; weak compactness; theorem of Eberlein and Krein. Prerequisite: general topology, including uniform spaces, linear algebra, and real and complex variables. (Academic year)

289 **Topological Groups** (3)

General theory of topological groups; neighborhood systems of the identity; uniform structures on groups, products, and inverse limits. Locally compact groups, classical linear groups, Lie groups. Open homomorphism and closed graph theorems, integration on locally compact groups, finite-dimensional representations of groups Schur's lemma, Peter-Weyl theorem, structure of metrizable compact groups. Duality, dual groups of locally compact Abelian groups, dual groups of compact and discrete groups. Prerequisite: general topology, including uniform spaces, linear algebra, and elementary group theory.

290 **Differentiable Manifolds** (3) Glick

Differentiable manifolds, tangent vectors and differentials, submanifolds, imbeddings and immersions, quotient manifolds, vector fields, Frobenius' theorem, tensors and differential forms, Lie derivatives, manifolds with boundary, orientable manifolds, Stokes' theorem, and the divergence theorem. Prerequisite: advanced calculus, linear algebra; or permission of instructor. (Fall)

291 **Differential Geometry** (3) Glick

Riemannian manifolds, geodesics, curvature and torsion, linear connections, Gauss-Bonnet theorem, Hopf index theorem, Morse index theorem; applications to mechanics, cohomology, and the de Rham theorem; the Laplace-Beltrami operator; Lie groups. Prerequisite: Math 290. (Spring)

292 **Introduction to Homotopy Theory** (3) Bari

Two-dimensional manifolds, classification theorem for compact surfaces, the fundamental group, homotopy type, homotopy equivalence of spaces; free groups and free products of groups, presentation by generators and relations; Seiffert-Von Kampen theorem, covering spaces of a graph, applications to group theory. (Fall)

293 **Introduction to Homology Theory** (3) Bari

Axioms and uniqueness, Eilenberg-Steenrod axioms and some immediate consequences. Uniqueness theorem. Computation of homology groups, elementary applications, e.g., invariance of dimension, extensions and retractions, fixed-point theorems, etc. Cellular homology groups, singular homology theory. (Spring)

RESEARCH

***295 Reading and Research** (3) **Staff**
May be repeated once for credit. (Fall and spring)

***299–300 Thesis Research** (3–3) **Staff**
(Fall and spring)

FOURTH GROUP

***398 Advanced Reading and Research** (arr.) **Staff**
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

***399 Dissertation Research** (arr.) **Staff**
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Microbiology

Professors Mary Louise Robbins, Rudolph Hugh, E.M. Lerner II (*Research*), L.F. Affronti (*Chairman*)
Professorial Lecturer Dorothy Heilman (*Cellular Immunology*)
Associate Professors Melvin Reich, Kun-yen Huang
Assistant Professors Yang-Ming Chu, Rosalie De Giovanni-Donnelly (*Research*)

Master of Science in the field of Microbiology.—Prerequisite: a Bachelor's degree with a major in Biology, Botany, Chemistry, or Zoology from this University, or an equivalent degree. The undergraduate program must have included the following courses or equivalent: B Sc 11–12; Chem 11–12, 151–52, 153–54; Math 30, 31 (31 may be taken concurrently with the graduate program); Phys 1, 2.

Required: the general requirements, pages 90–97. A total of 30 semester hours is required, 24 hours of course work and 6 hours of thesis (Micr 299–300). The course work must include Micr 211, 212 (if not presented for admission), plus Bioc 221–22; Epid 217, 218, 230; and Micr 219–20, 277–78. The remaining academic work should consist of graduate-level courses selected with the approval of the instructor.

Master of Science in the field of Mycology.—An interdepartmental degree offered by the departments of Biochemistry, Epidemiology and Environmental Health, and Microbiology. See the Department of Epidemiology and Environmental Health, which administers the program, for details.

Doctor of Philosophy in the field of Microbiology.—Required: the general requirements, pages 90–94, 97–99. Candidates must fulfill the tool requirement by passing a reading knowledge examination in French and German or by passing an examination in one of these languages and satisfactorily completing the tool requirement in Biostatistics. The General Examination covers at least four fields, two of which must be in microbiological disciplines.

Research fields: Clinical Microbiology, Determinative Bacteriology, Immunochemistry, Immunology, Microbial Genetics, Microbial Pharmacology, Microbial Physiology, and Virology.

211 **Microbiology** (4) Staff

Bacteria, fungi, rickettsiae, and viruses. Laboratory fee, $16. (Fall)

212 **Pathogenic Microbiology** (4) Staff

Continuation of Micr 211; emphasis on harmful activities of microorganisms. Prerequisite: Micr 211. Laboratory fee, $16. (Spring)

214 **Tissue Cell Culture and Somatic Variation** (4) Chu

Techniques of tissue culture and means of studying somatic variations. Prerequisite: Micr 211 or equivalent. (Spring)

219–20 **Scientific Writing for Graduate Students** (1–1) Robbins

Required of all graduate students prior to writing a thesis or dissertation. Some research experience required. (Academic year)

225 **Microbial Physiology I** (3) Affronti, Reich

Morphology and biochemistry of various microorganisms with emphasis on bacteria. Prerequisite: Bioc 221–22, Micr 211 or equivalent. (Fall)

226 **Microbial Physiology II** (3) Affronti, Reich

Effects of physical and chemical agents on microorganisims with emphasis on antibiotics. Prerequisite: Micr 225 or permission of instructor. (Spring)

230 **Immunology** (3) Affronti

Fundamental immunologic concepts. Serologic and immunologic procedures as applied to clinical and research situations emphasized. Prerequisite: Micr 211 or permission of instructor. Laboratory fee, $16. (Fall)

231 **Immunobiology** (1) Affronti

Study of immunological functions of reticulo-endothelial tissues, theories of autoimmunity, graft rejection, tumor immunity, delayed hypersensitivities, and immunogenetics. Admission by permission of instructor. (Fall)

233 **Biology of Viruses** (2) Robbins, Huang

Biochemical and genetic characterization of viruses. Prerequisite: Micr 211 or equivalent. (Fall)

234 **Biology of Viruses—Laboratory** (2) Robbins, Huang

Laboratory complement to Micr 233. Prerequisite or concurrent registration: Micr 233. Laboratory fee, $20. (Fall)

235 **Systematic Bacteriology** (2) Hugh

History of bacterial classification, international rules of nomenclature as applied to bacteria, development of bacterial classification based on relationships, survey of characteristics of bacterial groups. Prerequisite: Micr 212 or equivalent. (Fall 1974 and alternate falls)

251 **Clinical Laboratory Bacteriology** (2) Hugh

(Formerly Bacteriology)

For medical students; open to graduate students. Detection and identification of bacterial agents which cause diseases in man. Comparative isolation and identification methods; emphasis on interpretation and sig-

nificance of laboratory observations. Prerequisite: Micr 212 or equivalent. (Fall)

255 **Virology** (2) Huang, Robbins
General principles of virology; emphasis on clinical situations. Prerequisite: Micr 212 or equivalent. (Fall)

257 **Experimental Immunochemistry** (3) Affronti
Biochemical and physiochemical characterization of antigens and antibodies. Prerequisite: Bioc 221–22 or equivalent, Micr 230. Laboratory fee, $20. Limited enrollment. (Spring 1976 and alternate springs)

258 **Microbial Genetics** (2) De Giovanni-Donnelly
Survey of microbal systems that depict basic concepts of genetic principles. Prerequisite: Micr 211 or equivalent. (Spring)

277–78 **Seminar: Microbiology** (1–1) Staff
Required of graduate students. (Academic year)

293 **Special Topics in Microbiology** (arr.) Staff
Selected topics in microbiology. May be repeated for credit. (Fall and spring)

295 **Research in Microbiology** (arr.) Staff
Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Music

Professor George Steiner (*Chairman*)
Associate Professors Robert Parris, N.A. Tilkens
Adjunct Assistant Professor Margaret Tolson
Assistant Professorial Lecturer N.O. Scribner, Jr. (*Organ*)
Studio Lecturers in Applied Music W.B. Dobry (*Piano and Organ*), Sura Kim (*Piano*), Marian McNabb (*Piano and Organ*), Ylda Novik (*Piano*), Malnee Peris (*Piano*), W.D. Petterson (*Piano*), Constance Russell (*Piano*), C.O. Dash (*Voice*), S.H. Prussing (*Voice*), Jane White (*Voice*), Richard Parnas (*Violin and Viola*), R.J. Ferruzza (*Guitar*), J.E. Marlow (*Guitar*), R.A. Norris (*Guitar*), R.C. Raffaelle (*Guitar*), Dorothy Jarvinen (*Cello*), J.S. Martin, Jr. (*Cello*), N.M. Irvine (*Bass*), W.E. Fuhrman (*Flute*), W.H. Mann (*Flute*), T.P. Perazzoli (*Flute*), R.O. White (*Oboe*), W.R. Wright (*Clarinet and Saxophone*), Lewis Lipnick (*Bassoon and Recorder*), Walter

Maciejewicz (*Bassoon*), W.E. Arsers (*French Horn*), G.W. Recker (*Trumpet*), R.H. Kraft (*Trombone and Recorder*), T.H. Wardlow (*Percussion Instruments*), Faith Carman (*Harp*)

Bachelor of Arts with a major in Music History and Literature, Music Theory, or Applied Music (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Mus 5–6, 6 hours of Applied Music lessons, a minimum of 4 semesters in Music Ensemble groups (or evidence of equivalent experience).
3. Required courses in related areas—12 hours of one foreign language (French, German, or Italian recommended).
4. Required courses in the major—Mus 103–4, 131–32; 6 additional hours of Music Theory courses; 6 additional hours of Music History and Literature courses; plus 6 hours of courses in the area of the major. (Music Theory majors must meet departmental requirements for proficiency in piano; Applied Music majors must perform a complete public recital or the equivalent in major solo performances.)

Master of Arts in the field of Musicology.—Prerequisite: a Bachelor's degree with a major in music, or an equivalent degree.

Required: the general requirements, pages 90–97. The program of study consists of (1) 30 semester hours of course work including a thesis (6 semester hours), or (2) with the approval of the Department, 30 semester hours of course work without a thesis.

Master of Music in the field of Music Theory, Music Composition, Conducting, or Applied Music.—Prerequisite: a Bachelor's degree with an undergraduate major in one of the following, at this University, or an equivalent degree: (1) Music History and Literature, (2) Music Theory, or (3) Applied Music.

Required: the general requirements, pages 90–97. The required second- and third-group course work is as follows:

1. *In the field of Music Theory.*—Thirty semester hours of course work including either (a) a thesis (6 semester hours) demonstrating research ability in theoretical, creative, or analytical techniques; or (b), with the approval of the Department, 6 semester hours of Music Theory courses in lieu of a thesis.
2. *In the field of Music Composition.*—Thirty semester hours of course work including a creative thesis of one composition in large form properly prepared for performance (chamber music, a symphonic form, or a choral work with orchestral accompaniment) including a written theoretical, formal, and harmonic analysis of the work.
3. *In the field of Conducting.*—Thirty semester hours of course work including a thesis (6 semester hours) demonstrating research ability in theoretical, creative, or analytical techniques; or, with the approval of the Department, 30 semester hours of course work without a thesis. The requirements also include an acceptable public conducting performance.
4. *In the field of Applied Music.*—Thirty semester hours distributed as follows: (a) 12 semester hours of Applied Music in the area of concentration (piano, harpsichord, organ, voice, string or orchestral woodwind instrument); (b) 12 semester hours of Music Theory and Music History and Literature courses; and (c) a thesis (6 semester hours). The thesis consists of a public recital or performance before a designated committee—such a recital or performance must be representative of an extensive and well-rounded repertory, performed on a professionally accepted artistic level, including verbal historical and analytical lecture notes on the musical content of the program; demonstrated leadership in an ensemble performance (opera or oratorio for voice); and a written report on some approved theoretical area related to the student's concentration.

Bachelor of Arts in Education with a teaching field in Music.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Music option and professional courses listed on pages 114, 117.

MUSIC HISTORY AND LITERATURE

FIRST GROUP

3 Introduction to Musical Understanding (3) — Steiner and Staff

Introductory history of musical styles, related to listening; elements and materials of music. (Fall and spring)

4 Survey of Music Literature (3) — Steiner

Introductory study of musical forms, structures, and textures; aural analysis of selected literature. (Spring)

SECOND GROUP

103–4 History of Music (3–3) — Tilkens and Staff

Development of music in the Western World from the early Christian Era to the present. (Academic year)

105 Music of the Baroque Period (3) — Tilkens

Study of the musical styles, techniques, and literature from 1600 to 1750. (Fall)

106 Music of the Classic Period (3) — Tilkens

Study of styles, techniques, and literature from the 18th century schools through Haydn, Mozart, and Beethoven.

107 Music of the Romantic Period (3) — Staff

Study of the musical styles, backgrounds, and literature from Schubert through the 19th century.

108 Music of the 20th Century (3) — Steiner

The principal schools, techniques, developments, and trends of the 20th century. (Spring)

109 Orchestra Literature (3) — Steiner

Survey of the history and styles of orchestra literature, analysis of representative works.

110 Chamber Music Literature (3) — Steiner

Survey of the history and styles of chamber music literature, analysis of representative works.

121 The Opera (3) — Staff

Survey of the history and styles of opera, analysis of representative works.

125 Keyboard Music Literature (3) — Tilkens

Survey of the history, style, and major content of the keyboard literature from the 16th century to the present.

173 Piano Pedagogy (3) — Tolson

Principles, materials, and methods of piano teaching. (Spring)

199 Independent Research (3) — Staff

Under the guidance of an assigned instructor. Open only to qualified Music majors. May be repeated for credit. (Fall and spring)

THIRD GROUP

203 **Bibliography and Research Methodology** (3) — Staff
(Spring)

209 **History of Musical Instruments** (3) — Steiner

234 **Seminar: Performance Practices in Selected Areas** (3) — Staff

238 **Seminar: Analytical Studies in Music History** (3) — Tilkens
Topic for 1974: Brahms. (Fall)

239 **Independent Research** (3) — Staff

MUSIC THEORY

FIRST GROUP

1 **Elements of Music Theory** (3) — Parris, Tilkens
Notation, scales, keys, intervals, terms, rhythms, and chord structure. (Fall and spring)

2 **Ear-training** (3) — Staff
Melodic and harmonic dictation, ear-training, sight-singing, elementary keyboard harmony. (Spring)

5–6 **Harmony** (3–3) — Parris and Staff
Triads, inversions; chord analysis, construction, and progression; part-writing, modulations, altered chords. Prerequisite: Mus 1 or satisfactory passing of placement examination. (Academic year)

SECOND GROUP

131–32 **Advanced Theory** (3–3) — Parris and Staff
Practice in 18th century contrapuntal writing and analysis, chorale preludes, inventions, and fugues. Prerequisite: Mus 5–6 or equivalent. (Academic year)

135 **Counterpoint** (3) — Parris
Study and practice of 16th century contrapuntal techniques.

137 **Orchestration** (3) — Parris
Instrumental scoring.

138 **Form and Analysis** (3) — Parris
Analysis of musical forms in representative musical literature. (Spring)

151 **Conducting** (3) — Steiner
Technique of conducting, score reading, rehearsal procedures, analysis, and interpretation of selected musical literature; practice in conducting. (Fall)

THIRD GROUP

231–32 Composition (3–3) — Parris and Staff
May be repeated for credit. (Academic year)

237 Seminar: Analytical Studies in Music Theory (3) — Parris

251 Advanced Conducting (3) — Steiner
(Fall)

299–300 Thesis Research (3–3) — Staff
(Fall and spring)

APPLIED MUSIC

All Applied Music courses may be repeated for credit.

All Applied Music courses are offered both fall and spring.

Mus 51, 52, 53, 54, and 55 do not include individual lessons and do not require a supplementary fee. All other Applied Music courses include individual lessons and require a supplementary fee, as follows:

1. One-semester-hour courses: individual lessons of ½ hour a week, supplementary fee, $75.
2. Three- or 6-semester-hour courses: individual lessons of 1 hour a week, supplementary fee, $100.

Supplementary fees for applied music courses are nonrefundable after the first 3 weeks of the fall and spring semesters. Supplementary fees are different for courses offered during the summer sessions. Consult the Department of Music for details.

The supplementary fee is waived for graduate degree candidates in music and full-time undergraduate music majors.

FIRST GROUP

Required practice: 3 hours a week for 1-semester-hour courses and 6 hours a week for 3-semester-hour courses. In addition, 3-semester-hour courses include assigned workshops in theory and performance.

11 Piano (1) — Staff

12 Piano (3) — Staff

13 Voice (1) — Prussing, J. White, Dash

14 Voice (3) — Prussing, J. White, Dash

15 Organ (1) — Scribner, McNabb, Dobry

16 Organ (3) — Scribner, McNabb, Dobry

17 Violin (1) — Steiner, Parnas

18 Violin (3) — Steiner, Parnas

19 Classical Guitar (1) — Norris, Raffaelle, Marlow, Ferruzza

20 Classical Guitar (3) — Norris, Raffaelle, Marlow, Ferruzza

21 **Viola** (1)	Parnas
22 **Viola** (3)	Parnas
23 **Cello** (1)	Martin, Jarvinen
24 **Cello** (3)	Martin, Jarvinen
25 **Bass** (1)	Irvine
26 **Bass** (3)	Irvine
27 **Flute** (1)	Perazzoli, Fuhrman
28 **Flute** (3)	Perazzoli, Fuhrman
29 **Recorder** (1)	Kraft, Lipnick
30 **Recorder** (3)	Kraft, Lipnick
31 **Oboe** (1)	R. White
32 **Oboe** (3)	R. White
33 **Clarinet** (1)	Wright
34 **Clarinet** (3)	Wright
35 **Saxophone** (1)	Wright
36 **Saxophone** (3)	Wright
37 **Bassoon** (1)	Lipnick, Maciejewicz
38 **Bassoon** (3)	Lipnick, Maciejewicz
39 **French Horn** (1)	Arsers
40 **French Horn** (3)	Arsers
41 **Trumpet** (1)	Recker
42 **Trumpet** (3)	Recker
43 **Trombone** (1)	Kraft
44 **Trombone** (3)	Kraft
45 **Percussion** (1)	Wardlow
46 **Percussion** (3)	Wardlow
47 **Harp** (1)	Carman
48 **Harp** (3)	Carman
51 **Orchestra** (1)	Steiner

Preparation and performance of orchestral literature. Prerequisite: audition before Director.

52 **Instrumental Ensemble** (2)	Steiner

Chamber ensemble groups in addition to orchestra participation.

53 **Chorus** (1) — Prussing

Preparation and performance of choral literature. Prerequisite: audition before Director.

54 **Chamber Choir** (2) — Prussing

Small vocal groups in addition to chorus participation.

55 **Band** (1) — Recker

Concert band, stage hand, and brass ensemble.

SECOND GROUP

Departmental prerequisite: Audition to meet departmental requirements.

Required practice: 6 hours a week for 1-semester-hour courses and 12 hours a week for 3-semester-hour courses. In addition, 3-semester-hour courses include master performance classes and recital preparation.

111 **Piano** (1) — Staff

112 **Piano** (3) — Staff

113 **Voice** (1) — J. White, Dash

114 **Voice** (3) — J. White, Dash

115 **Organ** (1) — Scribner, McNabb, Dobry

116 **Organ** (3) — Scribner, McNabb, Dobry

117 **Orchestral Instrument** (1) — Staff

118 **Orchestral Instrument** (3) — Staff

119 **Classical Guitar** (1) — Staff

120 **Classical Guitar** (3) — Staff

THIRD GROUP

Required practice: 12 hours a week for 3-semester-hour courses and 15 hours a week for 6-semester-hour courses. In addition, 6-semester-hour courses include supervised ensemble preparation and required concert solo performances.

211 **Piano** (3)

212 **Piano** (6)

213 **Voice** (3)

214 **Voice** (6)

215 **Organ** (3)

216 **Organ** (6)

217 **Orchestral Instrument** (3)

218 **Orchestral Instrument** (6)

Pathology

Professors F.N. Miller, Jr., William Newman, J.C. Smith, B.H. Smith, Mary Matthews, Mario Werner (*Laboratory Medicine*), M.J. Valaske, G.H. Reifenstein, Alexander Breslow

Clinical Professors L.E. Zimmerman (*Ophthalmic*), J.M. Blumberg, E.B. Helwig (*Dermatologic*), N.S. Irey, Robert Sauer (*Comparative*), Cornelia Hoch-Ligeti, J.L. Luke (*Forensic*), C.F. Bishop (*Laboratory Medicine*), R.S. Melville (*Laboratory Medicine*)

Professorial Lecturers P.D. Olch (*History of Medicine*), Tatiana Antonovych

Associate Professors W.L. Marsh, Lois Platt (*Emeritus*), F.S. Jannotta, L.S. Lessin (*Hematology*), W.A. Burns, R.B. Lingeman, Nirmal Saini, M.F. Dolan (*Hematology*), S.G. Kent, B.C. Zook (*Comparative*)

Associate Clinical Professors V.E. Martens, R.E. Palmer, W.J. Jaffurs, M.A. Weinberger, C.B. Cook, H.A. Schwamm, A.D. Cramer (*Blood Banking*), F.B. Johnson, H.J. Norris

Assistant Professors Suzanne Hammersberg (*Medical Technology*), J.G. Guccion, Jocelyn Hicks, F.P. Abramson (*Research*), Patsy Robinson (*Microbiology*), M.H. Fusillo (*Laboratory Medicine*), P.A. Lindsay (*Laboratory Medicine*), J.A. Zeller (*Laboratory Medicine*), J.F. Jemionek (*Clinical Chemistry*), J.W. Eastman (*Laboratory Medicine*)

Assistant Clinical Professors W.F. Enos, Marjorie Williams, D.R. Parkinson, I.D. Godwin, F.M. Garner (*Comparative*), Gloria Brennan, F.R. Robinson (*Comparative*), Anne Baumhofer (*Clinical Microbiology*), J.W. Howell (*Clinical Chemistry*), B.D. Blackbourne (*Forensic*), M.B. Furlong, Jr. (*Laboratory Medicine*), B.J. Pearson (*Laboratory Medicine*)

Clinical Instructors C.R. Lissner (*Clinical Microbiology*), M.L. Pratt (*Blood Banking*), Milo Prodanovich (*Clinical Chemistry*), R.L. Dixon (*Hematology*)

Special Lecturers L.C. Johnson, Roma Chandra

Programs of study leading to the degrees of *Associate in Science (Medical Laboratory Techniques)* and *Bachelor of Science in Medical Technology* are described in the *School of Medicine and Health Sciences* catalogue.

Master of Science in the field of Anatomic Pathology.—Prerequisite: a Bachelor's degree from an accredited college or university. The undergraduate program should have included the following: (1) Biology—8 semester hours, including 4 hours of laboratory (this may be either in general biology or zoology but may not include separately credited courses in botany); (2) Chemistry—8 semester hours of general inorganic chemistry, including 4 semester hours of laboratory, and 6 semester hours of organic chemistry, including laboratory; (3) Physics—8 semester hours, including at least 2 hours of laboratory. Courses in embryology, microbiology, histology, genetics, and mathematics would also be useful.

Required: the general requirements, pages 90–97. The program of study consists of 45 semester hours of graduate work and must include the following: Anat 202, 203, 204, 205; Path 203-4, 205, 210, 215, 277, and 281.

Doctor of Philosophy in the field of Pathology.—Prerequisite: one of the following degrees from a recognized professional school: Doctor of Medicine (M.D.), Doctor of Veterinary Medicine (D.V.M.), or Doctor of Dentistry (D.D.S.). In exceptional cases, applicants with other backgrounds in the life sciences may be accepted.

Required: the general requirements, pages 90–94, 97–99, including 48 semester hours of approved graduate course work and a minimum of 24 semester hours of

dissertation research. One year of experience in pathology at the University Hospital, equivalent to Path 283, may be counted for a maximum of 24 semester hours of graduate course work. Other experience must satisfy the eligibility requirements of the appropriate national certifying body, i.e., the American Board of Pathology in the case of the M.D., the American Board of Veterinary Pathology in the case of the D.V.M., and the American Board of Oral Pathology in the case of the D.D.S.

Research fields: Comparative Pathology, Human Pathology, Ophthalmic Pathology, and Veterinary Pathology.

203–4 **Pathology (4–4)** Staff

General introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies. Limited enrollment. Prerequisite to Path 204: Path 203. (Academic year)

*205 **Comparative Pathology I (3)** Zook

An introduction to the study of disease in vertebrates, comparison with disease in man. Mechanisms by which various agents provoke illness; body defensive reactions. Illustration of common diseases of various species, including material from captive wild animals. Recommended: courses in anatomy, histology, and physiology. (Fall)

†210 **Comparative Pathology Laboratory** (2) Zook, Sauer

Special assignments for discussion and study, including study of common diseases of captive wild animals. Path. Lab., Nat'l. Zoological Park. (Fall)

†215 **Perinatal Pathology Laboratory** (2) Kent

Special assignments for dissection and study. (Fall)

†266 **Comparative Pathology II** (1) Sauer, Zook

Participation in an autopsy service involving wild animals in captivity and comparison of diseases in various animal species with those in man. Limited to 4 students. Path. Lab., Nat'l. Zoological Park. (Fall)

†271 **Tissue Reactions to Drugs** (1) Irey

Study of the problems involved in recognizing instances of untoward reaction to therapy. Case presentations. (Spring)

†277 **Anatomic Pathology Clerkship I** (arr.) Staff

A practical course in gross human anatomy and pathology. Prerequisite: Anat 201 or equivalent. Students may spend up to 24 weeks full-time on the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week period. Univ. and V.A. hosps. (Spring)

†281 **Anatomic Pathology Clerkship II** (arr.) Staff

A practical course in gross and microscopic human pathology. Prerequisite: Path 203–4 or equivalent. Students spend up to 24 weeks full-time, or the equivalent part-time, on the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week full-time period. Univ. and V.A. hosps. (Spring)

* An interdepartmental course offered by the departments of Pathology and Biological Sciences.
† Open to limited number of graduate students, with permission.

*283 **Anatomic Pathology Clerkship III** (arr.) Staff

Necropsy and surgical pathology service. Prerequisite: Path 203–4 or equivalent. Five semester hours of credit for each 4-week period. Students may receive up to 30 semester hours of credit for 6 months full-time. (Fall or spring)

*295 **Comparative Pathology III** (arr.) Robinson, Zook, Sauer

Participation in veterinary pathology service, including wild and domestic animals. Prerequisite: Path 203–4 or equivalent, Path 283. Five semester hours of credit for each 4-week period. Students may receive up to 30 semester hours of credit for 6 months full-time. Path. Lab., Nat'l. Zoological Park, and Armed Forces Inst. of Path. (Fall or spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Pharmacology

Professors H.G. Mandel (*Chairman*), V.H. Cohn, Jr., Paul Mazel, S.E. Fabro (*Research*), E.B. Truitt, Jr. (*Research*), Roy Hertz (*Research*)
Professorial Lecturer F.E. Hahn
Associate Professors K.S. Kim (*Research*), J.A. Straw, Philip Klubes
Assistant Professors G.S. Edwards, F.P. Abramson (*Research*), H.C. Harder, J.W. Dailey, E.W. Sutherland III (*Clinical*)
Special Lecturer P.J. Creaven

Master of Science in the field of Pharmacology.—Prerequisite: a Bachelor of Arts or Bachelor of Science degree. The undergraduate program must have included the following courses, or equivalent: B Sc 11–12; Phys 1, 2; Chem 11–12, 22, 151–52, 153–54. One year of calculus and a course in physical chemistry are normally recommended but may be taken during the work toward the Master's degree.

Required: the general requirements, pages 90–97, including Bioc 221–22; Phyl 201; Phar 205–6, 299–300. The remaining courses may be selected from Bioc 224, 227, 232, 241, 252, 260, 266; Chem 156, 251–52, 257; Micr 211, 212, 225, 226, 230, 233, 257, 258; Phar 254, 256, 267, 269, 272, 275–76, 277–78, 279, 281, 282, 283, 295.

Doctor of Philosophy in the field of Pharmacology.—Required: the general requirements pages 90–94, 97–99.

Research fields: Biochemical Pharmacology, Cancer Chemotherapy, Carcinogenesis, Developmental Pharmacology, Endocrine Pharmacology, Molecular Pharmacology, Neuropharmacology, Pharmacology of Drug Abuse, and Physiological Disposition of Drugs.

* Open to a limited number of graduate students, with permission.

115 **Drug Abuse Education** (3) Cohn and Staff

Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems, legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana and other hallucinogenic and psychedelic drugs. (Fall and spring)

203 **Fundamental Principles of Pharmacology** (2) Staff

Basic principles of pharmacology, including drug receptor interactions, structure activity relationship, pharmacokinetics, membrane phenomena, cellular control mechanisms, drug toxicity. (Fall)

205–6 **Pharmacology** (4–4) Mandel and Staff

Lectures, laboratory, conferences on interaction of drugs and biological systems as a basis of rational therapy of disease. Prerequisite: biochemistry and physiology, or approval of Department. Prerequisite to Phar 206: Phar 205. (Academic year)

215 **Adolescent Drug Abuse** (3 or 4) Cohn and Staff

Offered off campus through the College of General Studies. Primarily for teachers, counselors, and school administrators. Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse. (Fall and spring)

216 **Drug Abuse Education Techniques** (3) Cohn and Staff

Offered off campus through the College of General Studies. Primarily for teachers and counselors preparing to direct teacher and parent drug abuse education programs. Intensive review of current information on drug abuse, dynamics of group process, supervised practical experience. Prerequisite: Phar 215 and permission of instructor.

252 **Seminar: Clinical Pharmacology** (2) Staff

Principles of experimental design for the evaluation of drug efficacy and safety in man. Problems in therapeutics; emphasis on drugs used in treatment of cardiovascular and infectious diseases. Enrollment limited. (Spring 1976 and alternate springs)

254 **Frontiers in Pharmacology** (1) Mandel and Staff

Recent advances and fields of research in pharmacology. Presentations by laboratory scientists from neighboring institutions. (Spring)

256 **Molecular Pharmacology** (2) Hahn

Current theory on action of drugs, especially chemotherapeutic agents, at molecular level. Effect of drugs on biosynthetic processes of the cell with respect to DNA, messenger RNA, transfer RNA, ribosomes, protein, cell wall, and intermediary metabolites. Factors which alter action of drugs such as drug interactions and resistance. (Spring)

258 **Cancer Chemotherapy** (1) Mandel and Staff

Mechanisms by which drugs inhibit the growth of tumor cells. (Spring 1976 and alternate springs)

259 **Developmental Pharmacology** (1) Staff

Lectures, seminars, conferences. Teratogenic actions of drugs; pharmacological principles which apply during prenatal and perinatal development. (Spring 1976 and alternate springs)

260 **Endocrine Pharmacology** (1) Kim

Lectures and seminars on recent advances in the pharmacology and mechanisms of action of various hormones. (Spring 1975 and alternate springs)

267 **Pharmacological Research** (arr.) Staff

Research with staff members. May be repeated once for credit toward a Master of Science degree. (Fall and spring)

269 **Pharmacology Seminar** (1) Staff

Recent advances in pharmacology. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

272 **Physiological Disposition of Drugs** (3) Cohn

Fate of drugs in biological tissue. Absorption, distribution, chemical alteration, excretion of drugs; physical, chemical, and biological factors affecting these processes. Prerequisite: Phar 205–6 or equivalent. (Spring 1976 and alternate springs)

275–76 **Advanced Topics in Pharmacology I-II** (1–1) Staff

Lectures and seminars on advances in mechanisms of drug action, pharmacology of new drugs, theoretical aspects of pharmacology, laboratory techniques. (Academic year 1975–76 and alternate years)

277–78 **Advanced Topics in Pharmacology III-IV** (1–1) Staff

Continuation of Phar 275–76. (Academic year 1974–75 and alternate years)

279 **Special Topics in Pharmacology** (arr.) Staff

Selected aspects of drug action. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

281 **Physiological Techniques in Pharmacology—Lecture** (2) Mazel, Straw

Physiological techniques for obtaining information on mechanism and site of action of pharmacological agents. Phar 281 may be taken without 282. Prerequisite: Phar 205–6 or equivalent. (Spring 1976 and alternate springs)

282 **Physiological Techniques in Pharmacology—Laboratory** (2) Mazel, Straw

Accompanies Phar 281. Prerequisite: Phar 205–6 or equivalent. Prerequisite or concurrent registration: Phar 281. (Spring 1976 and alternate springs)

283 **Biochemical Techniques in Pharmacology** (arr.) Cohn

Lecture and laboratory. Theory and practice of modern biochemical techniques applicable to study of metabolic fate and mechanism of action of drugs. Prerequisite: Phar 205–6 or equivalent. (Fall or spring)

295 **Reading and Research** (arr.) Staff
Independent study for students preparing for the Master of Science degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Philosophy

Professors Thelma Z. Lavine (*Chairman*), R.H. Schlagel
Associate Professors C.H. Pfuntner, W.B. Griffith, R.S. French
Assistant Professor Walter Soffer

Bachelor of Arts with a major in Philosophy (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80-86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)

2. Required courses in related areas—6 semester hours of literature courses selected from Chinese, Classics, English, French, German, Italian, Slavic, or Spanish (Clas 71, 72, or Engl 91–92 recommended); 6 hours selected from Art History, Music History and Literature, or Religion; 6 hours in History (Hist 39–40 recommended).

3. Required courses in the major—Phil 111, 112, 113; 9 semester hours selected from Phil 121, 131, 151, 152; 6 semester hours selected from Phil 172, 192, 193, plus 6 additional semester hours of second-group Philosophy courses.

For students expecting to continue in graduate school, it is recommended that they include in their program of study 12 semester hours of introductory French, German, or Greek language courses.

Master of Arts in the field of Philosophy.—Prerequisite: a Bachelor's degree with an undergraduate major in Philosophy at this University, or an equivalent degree. The undergraduate program should have included the following courses or their equivalent: Phil 111, 112, 113, 121, 131, and 152.

Required: the general requirements, pages 90–97. The program of study consists of a minimum of 30 semester hours of second- and third-group courses with or without a thesis. A Master's Comprehensive Examination is required in two areas of philosophy: the History of Philosophy; Problems of Philosophy and Contemporary Philosophy.

PHILOSOPHY AND SOCIAL POLICY—GRADUATE STUDY

The Graduate School of Arts and Sciences offers an interdisciplinary program leading to the degree of *Master of Arts in Special Studies* with an area of concentration in Philosophy and Social Policy. The program brings the normative, historical, and analytical-logical skills of philosophical inquiry to bear upon contemporary problems

of social policy. Prerequisite: a Bachelor's degree from an accredited college or university. Students are expected to have completed the prerequisites to graduate courses.

Required: the general requirements, pages 90-97. The program of study consists of 36 semester hours with or without a thesis, including a plurality of approved courses in the Arts and Sciences with no more than one-third from any one department. Phil 195, 198, 231, and 272 are required. Courses may also be selected from the School of Education, the School of Government and Business Administration, and the National Law Center. All candidates are required to pass a Master's Comprehensive Examination. Prospective candidates should consult the director of the program regarding specific requirements and the selection of courses outside the Department of Philosophy.

FIRST GROUP

50 **Introduction to Philosophy** (3) — Staff

Readings from major philosophers and study of philosophic positions from Plato to the present. (Fall and spring)

71 **Philosophy and Literature** (3) — Lavine

Philosophical foundations of psychoanalytical psychiatry, existentialism, and Marxism and their expression in literature, e.g., in the works of Mann, Kafka, Camus, Sartre, Hesse, and Koestler. (Spring)

SECOND GROUP

101 **Logic, Scientific Inference, and Legal Argument** (3) — Griffith

Analysis of some main patterns of argument, including deductive, scientific (inductive, probabilistic), and legal; emphasis on concrete examples.

111 **History of Ancient Philosophy** (3) — Pfuntner

History of Western philosophy from early Greece to the early Middle Ages. (Fall)

112 **History of Modern Philosophy** (3) — Soffer

History of Western philosophy of the 17th and 18th centuries (Descartes to Kant). (Spring)

113 **19th Century Philosophy** (3) — Lavine

European philosophy from Kant to Nietzsche. (Fall)

121 **Introduction to Symbolic Logic** (3) — Griffith

Systematic study of the principles of valid inference with attention to the development of skill in logical analysis and evaluation of arguments, and to the elementary theory of formal systems. (Spring)

*127 **Theories of History** (3) — Lavine

Critiques of philosophies of history: idea of progress, historicism, Hegelian-Marxian dialectic, cyclical and social-scientific views. Contemporary problems of historical knowledge. (Fall)

131 **Ethics** (3) — Griffith

Theories of the "good" and "the right" from Plato to Sartre. (Fall)

* An interdepartmental course offered by the departments of Philosophy and History.

132 **Social Philosophy** (3) Lavine
Social philosophies from Locke to contemporary theorists. (Spring)

142 **Philosophy of Law** (3)
Systematic examination of the fundamental concepts of law and jurisprudence; special emphasis on their treatment by contemporary philosophers and jurists.

151 **Myth, Science, and the Modern Mind** (3) Schlagel
Comparison of the mythical and scientific outlook; emphasis on the development and nature of scientific concepts, methodology, and explanation from Copernicus to Einstein. (Fall)

152 **Knowledge, Truth, and Reality** (3) Schlagel
Inquiry into the basis and structure of knowledge, the problem of perception and independent reality, and the meaning and criteria of truth. (Spring)

162 **Aesthetics** (3) Pfuntner
Nature of aesthetic experience, problems of appreciation and criticism in the arts, and theories of artistic creation. Emphasis on contemporary arts and criticism. (Spring)

163 **Philosophy and the Film** (3) Pfuntner
Examination of aesthetic theories in relation to the film as most familiar and most powerful of 20th century art forms Readings in aesthetic theory and film criticism. Viewing and critique of about eight films.

172 **American Philosophy** (3) Pfuntner
Philosophies of Peirce, Royce, James, Dewey, and Santayana as representatives of American thought. (Fall)

182 **Philosophical Foundations of Psychology** (3) Soffer
The philosophical significance of psychology as a modern science focusing on the conflicts between (1) gestalt and classical psychology and (2) phenomenological and behavioristic psychology.

192 **Contemporary Philosophy: Analytical** (3) Schlagel
The two dominant movements of recent Anglo-American philosophy, logical positivism and British ordinary language philosophy, as represented by Russell, G. E. Moore, Wittgenstein, Ryle, Ayer, etc. (Fall)

193 **Contemporary Philosophy: Phenomenological** (3) Soffer
The phenomenological movement, including its development into German and French existentialism, and its more recent phases. (Fall)

195 **Man and Nature in Public Policy** (3) French
Influence of philosophical conceptions of man and nature on national policies of growth and development in selected periods of American history. (Fall)

198 **Philosophy of the Social Sciences** (3) Lavine
Analysis of philosophic issues relating to theory, methodology, and application of the social sciences, with exemplification in one major contemporary social scientific project. (Spring)

THIRD GROUP

201–2 **Readings and Research** (3–3) Staff
Advanced readings and reports. Investigation of special problems. (Academic year)

216 **Seminar: Kant** (3) Schlagel
Critique of Pure Reason.

221 **Seminar: Logical Theory** (3) Griffith
Metatheory of deductive systems, modal logics; historical and philosophical import of recent developments.

231 **Ethics and Economic Policy: Justice and Equality** (3) Griffith
(*Formerly Seminar: Ethical Theory*)
Economic policy viewed from the perspectives of ethical and economic theories with special focus upon the issue of income distribution in the United States. (Fall)

251 **Seminar: Philosophy of Science** (3) Schlagel
Intensive study of selected problems in the historical and theoretical foundations of science.

252 **Seminar: Epistemology** (3) Schlagel
Study of selected problems. Topic for 1974: The identity theory of mind-body. (Fall)

272 **Pragmatic Naturalism and American Social Policy** (3) Pfuntner
(*Formerly Seminar: American Philosophy*)
Examination of pragmatic naturalism as a criticism and reconstruction of American institutions. Evaluation of current philosophical and theological alternatives to naturalism and proposal of a new "ecologistic" naturalism. (Spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Physical Education, Health, and Recreation

Professors R.G. Hanken, Loretta Stallings, J.L. Breen (*Chairman*), Donald Hawkins (*Research*)
Professorial Lecturers W.D. Thompson, Margie Hanson, Edith Ball
Associate Professors Lyndale George, Jeanne Snodgrass, Maida Withers, Sharon Leigh Clark
Adjunct Associate Professor D.C. Paup
Associate Professorial Lecturers Evelyn DeBoeck, Mike Millan, P.J. Verhoven, J.W. Eberhard
Assistant Professors Honey W. Nashman, Nancy Johnson
Assistant Professorial Lecturers Barbara Katz, S.Y. Cha, W.A. Hillman, Jr., Lawrence Houstoun, Jr.

Lecturers Calva Collier, Elisabeth Burkhardt, Margaret Sinclair, Margaret Ramsay, Jan Van Dyke, Ann Lohn

Programs of study leading to the degrees of *Bachelor of Science in Physical Education* (opportunity for specialization in elementary and secondary school physical education or dance), *Master of Arts in Education* (field in Physical Education and Recreation, with specialization in adaptive physical education, dance, elementary or secondary school physical education, therapeutic recreation, tourism development, or urban recreation and parks) are offered by the School of Education (see pages 102-29).

This Department includes all the recognized sport and dance activities of University students except intercollegiate athletics for men.

From 3 to 4 semester hours of first-group Physical Education, Health, and Recreation courses are required for Bachelor's degree candidates in the education and physical education curriculum in Columbian College of Arts and Sciences.

The University is not responsible for injuries received in intramural games or in any of the activities of the Department of Physical Education, Health, and Recreation, and the student assumes full responsibility therefor.

FIRST GROUP

Courses numbered from 1 to 49 are beginning activities courses and require a minimum of 24 clock hours of instruction.

Courses numbered from 50 to 100 are for students who wish in-depth training in a particular activity. They require a minimum of 48 clock hours of instruction.

A physical education activities fee of $4.50 a semester is required for registration in one or more of the activity courses (numbered 1 to 100).

Students whose medical examinations indicate the desirability for remedial or restricted activity are assigned to programs especially adapted to their needs.

Unless otherwise indicated, all first-group courses are offered both in the fall and spring semester.

All first-group courses may be repeated with permission of the instructor.

10 **Beginning Badminton** (1) Breen

11 **Beginning Bowling** (1) Staff

12 **Introduction to Ballet** (1) (Spring only) Staff

13 **Beginning Ballet Technique** (1) Sinclair

14 **Intermediate Ballet Technique** (1) Sinclair

15 **Intermediate/Advanced Ballet Technique** (1) Sinclair

16 **Introduction to Modern Dance** (1) (Fall only) Staff

17 **Beginning Modern Dance Technique** (1) Staff

18 **Intermediate Modern Dance Technique** (1) Staff

19 **Ethnic Dance** (1) Johnson
(Formerly Folk Dance)

20 **Beginning/Intermediate Golf** (1) Staff

21 **Foil Fencing** (1) Snodgrass

22 **Basketball** (1) (Men only) Hanke

23 **Touch Football** (1) (Men only) (Fall only) — Hanken

24 **Volleyball** (1) — Hanken

25 **Softball** (1) (Spring only) — George

26 **Karate (Korean Style)** (1) — Cha

27 **Beginning Tennis** (1) — George

28 **Intermediate Karate (Korean Style)** (1) — Cha

29 **Yoga** (1) — Burkhardt

30 **Ski Conditioning** (1) — Snodgrass

31 **Backpacking** (1) — Staff

50 **League Bowling** (2) — Staff
Emphasis on competitive bowling as a lifetime sport.

51 **Gymnastics** (2) — Staff
Emphasis on apparatus and trampoline.

52 **Intermediate/Advanced Modern Dance Technique** (2) — Withers
Admission by permission of instructor.

53 **Advanced Modern Dance Technique** (2) — Withers

54 **Intermediate/Advanced Tennis** (2) — George
Development of skills, theories of strategy; emphasis on competitive play as a lifetime sport.

57 **Intermediate/Advanced Badminton** (2) (Spring only) — Breen

SECOND GROUP

101 **Physical Education in the Elementary School** (3) — Snodgrass
For Elementary Education and Physical Education majors. Child growth and development related to school and playground programs in movement. Philosophy, curriculum, techniques of teaching, and equipment evaluation. (Fall)

102 **Movement Education** (3) — Snodgrass
Techniques of teaching movement education with emphasis on problem-solving methods for kindergarten and grades 1–6. Prerequisite: PE 101 or permission of instructor. (Spring)

105 **Introduction to Adaptive Physical Education and Therapeutic Recreation** (3) — Hillman
Corrective, developmental activities for the handicapped—orthopaedic, neurological, cardiovascular, and mentally retarded. Clinical experience. (Fall)

106 **Introduction to Dance Therapy** (3) — Lohn
General survey of dance therapy areas from theoretical and experimental points of view. Exploration of professional opportunities.

107 Teaching Ethnic Dance (2) Johnson

Methods and materials for teaching the folk and social forms of dance. (Spring)

108 Dance Improvisation (2) Withers

Awareness of body movements, environment, group dynamics, performance, and composition through improvisational technique. (Fall and spring)

109–10 Dance Composition (3–3) Withers

PE 109: basic elements and principles of composition. PE 110: advanced problems in composition. (Academic year)

111–12 Sports Education Technique (3–3) Staff

Techniques for teaching individual, dual, and team sports. (Academic year)

113–14 Field Experience: Practicum in Physical Education, Dance, or Recreation (3–3) Staff

Pre-practice teaching or leadership in elementary or secondary school physical education; adaptive physical education, dance, or recreation settings. Seminars relating to field experiences. (Academic year)

116 Mime Movement Theatre (1) Staff

(Formerly Movement for Actors)

Psychological improvisation, improvisation with masks, Commedia dell'Arte, Pantomime Blanche, chorus work, clown work.

117 Techniques of Teaching Dance (3) Johnson

Organizational, philosophical, and conceptual approaches to the teaching of dance in academic and institutional settings. Admission by permission of instructor. (Fall)

118 Special Problems in Dance Composition (1) Staff

Work with elements of movement leading to short composition studies.

119 Creative Dance for Children (3) Withers

Study of dance as an expressive medium for children; emphasis on concepts and principles, methods and materials. Consideration given to dance for children with special education problems. (Spring)

120 Repertory (1 or 2) Johnson

Study and performance of dance works. Admission by permission of instructor. May be repeated for credit not to exceed 4 semester hours. (Fall and spring)

121 Dance Technique I (1) Staff

Intermediate/advanced modern dance. May be repeated once for credit. (Fall and spring)

122 Methods and Materials for Health Education (3) Stallings

Conceptual approach to curriculum design and teaching, including planning and organization, methodology, selection and use of materials, and evaluation; basic health knowledge. (Fall)

123 **Dance Technique II** (1 or 2) Withers

Advanced modern dance. May be repeated for credit not to exceed 4 semester hours. (Fall and spring)

124 **Movement Technique** (1) Staff

Analysis of movement, dramatic justification of movement; mime technique; respiration and its integration with movement.

129 **Introduction to Motor Learning** (3) Stallings

Concepts of motor skill learning; variables of motor performance and learning with implications for teaching movement skills. (Spring)

130 **Motor Performance in Childhood** (3) Snodgrass

Study of the evolvement and refinement of fundamental movement skills. (Spring)

135–36 **Dance History** (3–3) Johnson

Study of dance from antiquity to present; emphasis on cultural significance of dance as art form, symbolic form, and social behavior. PE 135: antiquity to classical period. PE 136: 19th and 20th centuries. (Academic year)

137 **Dance Notation** (3) Katz

Survey of systems of notation; concentration on the work of Rudolf Laban. (Spring)

138 **Physical Education Curriculum and Administration** (3) George

Curriculum and administration in physical education. Professional ethics. (Fall)

139 **Teacher Behavior** (2 or 3) Breen

Teacher behavior analyzed in relation to motives, attitudes, and expectations. Integration of structure, psychological processes, and behavior emphasized for a more thorough understanding of the adjustment processes. (Spring)

141–42 **Dance Production** (2–2) Johnson

Theories and practicum in technical aspects of production. PE 141: lighting, sound, and media. PE 142: theatre management, costuming, sets. (Academic year)

144 **Choreography** (2) Withers

Solo and group. May be repeated once for credit. (Fall and spring)

150 **Human Anatomy** (3) Stallings

Systematic study of the structure of the human body; emphasis on kinesiological anatomy, including joints, muscles, and neuromuscular integration. (Fall)

151 **Kinesiology** (3) Paup

Analysis of human movement, including mechanical physics, anatomy, and physiology. Prerequisite: approved course in anatomy. (Spring)

152 **Environment, Leisure, and Quality of Life** (3) Houstoun

Environmental problem-solving through ecological and social planning;

concentration on the impact of leisure on man's total physical and cultural development; emphasis on philosophical considerations. (Fall)

156 **Application of Recreational Skills to Urban Living** (3) George

Development of recreational skills; emphasis on local opportunities for recreational activities. Current trends in urban recreational development and program planning. May be repeated for credit with permission of instructor. (Fall and spring)

157 **Dance Technique and Theory** (2) Withers

Theories of movement; analysis and practice of contemporary dance techniques. Individual application. (Fall)

158 **Safety Education** (3) Millan

Liability, prevention, and emergency care of all types of injuries with reference to first aid and athletics. Proper use of personnel, facilities, and equipment. (Fall)

164 **Physiology of Exercise** (3) Paup

The physiological functions of the body and the effect of exercise on these functions. Prerequisite: PE 150 or permission of instructor. (Spring)

170 **Problems Seminar** (3) George

Content differs each time course is offered, according to current issues, professional policies, and practices. May be repeated for credit. (Spring)

171 **Current Professional Literature** (2 or 3) Snodgrass

Study of current education literature with implications for physical education and the utilization of retrieval systems. (Fall)

172 **International Experiences** (1 to 6) Staff

Special travel to foreign countries to study programs with implications for professional development.

173 **Independent Study** (1 to 3) Staff

Individually designed model for intensive study in an area of special interest. Prerequisite: demonstrated competency for independent work and permission of adviser and instructor. (Fall and spring)

175 **Dance Accompaniment** (3) DeBoeck

Analysis of music composition and notation. Accompaniment for the dance. Resources in music for dance. Prerequisite: basic knowledge of rhythmic theory. (Fall)

184 **Workshop** (1 to 3) Staff

Workshops in Physical Education, Dance, and Recreation. Current problems, practices, and new approaches. Content of each workshop will depend on current needs. May be repeated for credit with permission of adviser.

THIRD GROUP

201 **Philosophic Foundations of Physical Education** (3) Breer

Concepts of philosophy and research method applied to objectives and practices in physical education. (Spring)

202 **Conceptual Basis of Motor Learning** (3) Stallings

Theories of learning and application to development of motor skills. (Fall and spring)

205 **Diagnostic-Prescriptive Techniques: Perceptual-Motor Domain** (3) Stallings

Programs of perceptual-motor development and their theoretical assumptions; diagnostic and remediation techniques. (Spring)

211 **Problems and Modern Trends in Physical Education** (3) Breen

Lecture (2 hours), conference (1 hour). For experienced teachers. Organization, supervision, and curriculum problems growing out of current issues; program planning policies; competition.

220 **Problems in Health Education** (3) Staff

Lecture (2 hours), conference (1 hour). Health needs, policies and program planning, use of community resources, promising practices in the field. (Fall)

230 **Movement Analysis** (3) Breen

Scientific analysis of fundamental movement and sports skills. (Fall 1974 and alternate falls)

232 **Current Issues in Elementary School Physical Education** (3) Hanson

Current philosophy, trends, and research; implications for curriculum, instruction, evaluation. (Spring)

234 **Organization and Administration of Elementary School Physical Education** (3) Hanson

For school administrators, supervisors, principals, and physical education specialists. Curriculum, administrative, and supervisory problems; kindergarten, grades 1–6. (Spring)

239 **Urban Recreation for Special Populations** (3) Verhoven

Development of recreation for the disabled, impaired, and handicapped using the Baltimore-Washington areas as the urban problem setting; development of competencies in community organization, communications, consultation, group dynamics, and interpersonal relations; program development and evaluation. (Spring)

240 **Physical Education for the Handicapped** (3) Breen and Staff

Adaptive physical education for handicapped populations; development of competencies in diagnostic/prescriptive teaching, program design and evaluation, consultation, and communications. (Fall)

244 **Therapeutic Recreation Practice** (3) Ball

Professional competencies for delivery of services to the handicapped, disabled, impaired; public and private setting for service delivery; client assessment and counseling techniques; basic special education, medical, and rehabilitation terminology; etiology of handicapping conditions as related to recreation. (Spring)

245 **Medical Aspects of Therapeutic Recreation and Adaptive Physical Education** (3) Hawkins

Etiology, symptomology, and treatment of chronic and traumatic dis-

orders associated with handicapping conditions; implications for programming, facility development, and related aspects of therapeutic recreation or adaptive physical education. (Fall)

250 **Administration of Urban Leisure Services** (3) Verhoven

Planning and organization of a comprehensive system of urban leisure services utilizing educational, cultural, and recreational resources; emphasis on public relations, personnel administration and supervision, systems analysis, fiscal management and managerial accountability. (Spring)

256 **Sports Medicine and Rehabilitation** (3) Naughton*

Theory and practice of therapeutic exercise and recreation as applied to the rehabilitation of the handicapped; injuries; preventive, adapted, and remedial concepts; research in area of general rehabilitation practice; professional roles as related to ancillary medical focus. (Spring)

260 **Tourism Development** (3) Hawkins

Socioeconomic analysis of demand for travel and tourism resources; techniques for planning and design; examination of current trends. (Spring)

265 **Sports Policy and Political Systems** (3) Breen

Methods of political analysis applied to sports policy; comparative approach to the study of the relationships between ideology, economic development, and the types and levels of government involvement in sports policy. (Spring)

270 **Philosophic Foundations of Dance** (3) Clark

Examination and discussion of problems in dance confronting the artist as well as the audience, in terms of dance as an art form and the creating and experiencing of that form.

271 **Dance Notation I** (3) Katz

Study and reconstruction of dance from dance literature; application of notation to dance curriculum; may lead to intermediate certification. Prerequisite: PE 137. (Fall)

272 **Dance Notation II** (3) Katz

Designed to meet individual interest and needs of the student at intermediate/advanced level of notation. Focuses on projects in notation and reconstructing dance works. Prerequisite: PE 271. (Spring)

273 **Advanced Choreography** (3) Clark

Advanced problems in creative movement and composition. Choreographing of group and solo works in dance. May be repeated once for credit. (Fall and spring)

276 **Dance in Society** (3) Clark

(Formerly Dance in Culture)

Anthropological aspects of dance; emphasis on current research and literature.

* Dr. J.P. Naughton is Professor of Medicine in the University's School of Medicine and Health Sciences.

277 **Dance Expressions in Selected Cultures** (3 or 6) Clark

Investigation of traditional dance form through research and field work. Research may be conducted in the field or by use of other techniques. (Fall and spring)

280 **Advanced Workshop** (1 to 3) Staff

Workshops in Physical Education, Dance, and Recreation. Emphasis on contemporary issues and problems; development of advanced professional competencies. May be repeated for credit with permission of adviser.

283 **Supervised Experience in Physical Education, Recreation, or Dance** (3 or 6) Staff

Field work, internship and/or instructional practice, including conference and/or seminar. May be repeated once for credit with permission of adviser. (Fall and spring)

296 **A Systems Approach to Recreation and Park Resource Development** (3) Eberhard

(Formerly A Systems Approach to Human Resource Development)

Comprehensive planning, human resource development, and program facility design, using systems approaches. (Fall)

297 **Advanced Topical Studies** (3) Staff

Independent research and study pertinent to the needs of the student. Prerequisite: Educ 295 or permission of instructor. May be repeated once for credit with permission of the adviser. (Fall and spring)

Physical Science

See "Chemistry."

Physics

Professors G.M. Koehl, H.H. Hobbs (*Chairman*), Julian Eisenstein, Otto Bergmann, A.J. Zuchelli, Francisco Prats

Assistant Professors N.K. Khatcheressian, W.C. Parke, M.F. Taragin, D.R. Lehman, D.D. Thornton

Bachelor of Arts or Bachelor of Science with a major in Physics (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Phys 1, 2, 31–32; Chem 11–12; Math 31, 32, 33.
3. Required course in related area—Stat 97 or EE 51.
4. Required courses in the major—Phys 151–52, 161, 162, 163, 164, 165–66, 167, 168.

Master of Arts in the field of Physics.—Prerequisite: a Bachelor's degree with a major in Physics at this University, or an equivalent degree.

Required: the general requirements, pages 90–97, including Phys 231, 232, 233–34, 235, 236, 299–300, plus *one* of the following: Phys 241, 242, 243, 244, 245, or 251–52.

Doctor of Philosophy in the field of Physics.—Required: the general requirements, pages 90–94, 97–99.

Research fields: Experimental Solid State Physics (Electrical Conductivity of Solids, Defects in Crystals, Magnetic Properties of Solids at Low Temperatures, Magnetic Resonance, Mössbauer Effect, Superconductivity), and Theoretical Physics (Elementary Particles, Field Theory, General Relativity, Magnetic and Optical Properties of Solids, Molecular Structure, Nuclear Scattering, Quantum Mechanics).

Bachelor of Arts in Education with a teaching field in Physics.—Prerequisite: the Education curriculum pages 76–77.

Required: the Physics option and the professional courses listed on pages 114, 117.

Departmental prerequisite: Phys 31–32 or equivalent, and consent of a Departmental adviser, are prerequisite to all second-group courses in Physics.

ASTRONOMY

FIRST GROUP

9–10 Introduction to Astronomy (3–3) Staff

Lecture (2 hours), recitation (1 hour), laboratory (2 hours). Classical through modern astronomy with introduction to basic principles underlying astronomical systems and observations. Primarily for nonscience majors. Laboratory fee, $11 a semester. (Academic year)

***11–12 Introduction to Astronomy (2–2)** Staff

Same as Phys 9–10 without the laboratory. (Academic year)

21 Modern Cosmology (3) Staff

Nonmathematical treatment of cosmology and related subjects from astronomy and physics. Quasars, peculiar galaxies, pulsars, black holes, antimatter, etc. Prerequisite: Phys 10 or 12. (Fall)

PHYSICS

FIRST GROUP

1 General Physics (4) Staff

Topics in classical physics which form a foundation for modern physics. Prerequisite: two years of college preparatory mathematics or concurrent registration for Math 6. Laboratory fee, $11. (Fall and spring)

2 Introduction to Modern Physics (4) Staff

Selected topics in modern physics, including relativity and quantum theory. Prerequisite: Phys 1 or equivalent. Laboratory fee, $11. (Fall and spring)

†3 General Physics (3) Staff

Same as Phys 1 without laboratory. (Fall and spring)

‡4 Introduction to Modern Physics (3) Staff

Same as Phys 2 without laboratory. (Fall and spring)

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* This course may not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 9–10.

† This course may not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 1.

‡ This course may not be taken by students who have completed, or are enrolled in, or plan to enroll in Phys 2.

5 Topics in Contemporary Physics (3) Staff

Discussion of current developments based on recent *Scientific American* articles in the physical sciences. Topics include relativity, quantum theory, elementary particles, lasers, Mössbauer effect, etc. Prerequisite: high school physics and two years of college preparatory mathematics.

6 Energy and the Environment: from Lightning to Thermonuclear Power (3) Staff

(Formerly Energy and Entropy: from Lightning to Thermonculear Power)

The energy concept; energy conservation and power production. The entropy concept; its relation to disorder and information. Thermonuclear reactions and their potential use as an energy source. Prerequisite: high school algebra.

7 Ideas of Physics—History and Analysis (3) Staff

The development of atomic theory and corresponding views of space and time are discussed. Physical phenomena which were relevant to the evolution of the atomic theory are treated in historical perspective. Prerequisite: high school algebra.

27–28 Physics in Medicine (3–3) Staff

Principles of physics applied to biological systems: nerve pulse detection, photosensitive and acoustical receptors, circulation dynamics, bioenergetics, radiation and living matter. Physical principles behind operation of medical instruments. Prerequisite: Phys 2 or equivalent. (Academic year)

31–32 Introduction to Theoretical Physics (3–3) Staff

Theoretical structure of physics, emphasis on appropriate analytical techniques. Prerequisite: two semesters of calculus and Phys 2. (Academic year)

SECOND GROUP

151–52 Intermediate Laboratory (3–3) Staff

Independent advanced work to introduce students to laboratory and shop techniques and the use of specialized instruments. Laboratory fee, $11 a semester. (Academic year)

161 Mechanics I (3) Staff

Mechanics of mass points and rigid bodies. Newton's laws, conservation laws, Euler's equations, inertia tensor, small vibrations, and elements of Lagrange's and Hamilton's equations. (Fall 1974 and alternate falls)

162 Mechanics II (3) Staff

Basic aspects of elasticity and fluid dynamics, strain tensor, stress tensor, equations of equilibrium, elastic waves, ideal and viscous fluids. (Spring 1975 and alternate springs)

163 Physical and Quantum Optics (3) Staff

Oscillations and waves, energy and momentum of the electromagnetic field, interference, diffraction, geometrical optics, optics of crystals and other media, dispersion. (Fall 1975 and alternate falls)

164 **Thermodynamics** (3) Staff

Basic principles of thermodynamics, reversible changes, applications to simple systems, thermodynamic potentials, phase equilibrium. (Spring 1976 and alternate springs)

165–66 **Electromagnetic Theory** (3–3) Staff

Development of Maxwell's field equations using vector and tensor calculus, electrostatics, stationary and nonstationary phenomena, basic circuit theory, electromagnetic waves and radiation. (Academic year 1975–76 and alternate years)

167 **Principles of Quantum Physics** (3) Staff

Experimental background and theoretical basis of quantum mechanics. (Fall 1974 and alternate falls)

168 **Applied Quantum Physics** (3) Staff

Applications of quantum mechanics to statistical mechanics and to atomic, molecular, and nuclear physics. (Spring 1975 and alternate springs)

170 **Elementary Solid State Physics** (3) Staff

Dielectric and magnetic properties of solids, behavior of electrons in metals and semi-conductors, lattice defects. (Fall 1975 and alternate falls)

175 **Nuclear Physics** (3) Staff

Structure and stability of atomic nuclei, nuclear transformations and reactions, radiations of nuclei, fission. (Spring 1975 and alternate springs)

THIRD GROUP

Consent of a departmental graduate adviser is required for admission to all third-group courses in Physics.

231 **Electromagnetic Theory: Macroscopic Effects** (3) Staff

Static boundary-value problems, multipoles, dielectrics, and macroscopic media, time-varying fields, plane electromagnetic waves. (Fall)

232 **Advanced Mechanics** (3) Staff

Analytic methods of mechanics as a basis for modern theory: variational principles, Lagrange's equations, Hamiltonian formulation, canonical transformations, classical perturbation theory, transition to continuum. (Fall)

233–34 **Quantum Mechanics** (3–3) Staff

General aspects of quantum mechanics with emphasis upon the developmental principles involved. Operators, representations and transformation theory, Schrodinger and Heisenberg pictures, angular momentum, perturbation theory, scattering theory. (Academic year)

235 **Special Relativity** (3) Staff

Application of relativistic concepts to the basic fields of physics: space and time, tensors and covariant mechanics of point particles, covariant form of electromagnetism, relativistic variational principles, relativistic quantum equations. (Fall 1974 and alternate falls)

236 **Electromagnetic Theory: Electrodynamics and Radiative Effects** (3) Staff

Wave guides, resonant cavities, simple radiating systems, covariant methods, radiation by moving charges, multipole fields, radiation damping. (Spring)

241 **Statistical Mechanics** (3) Staff

Study of atomic configurations under thermodynamic conditions by use of partition functions and cluster expansion techniques; ideal and non-ideal gases; electron plasmas; changes of state. (Spring)

242 **Atomic and Molecular Structure** (3) Staff

Structure of atoms and molecules, energy levels, binding energy, optical activity. Hartree and Hartree-Fock equations, spin-effects, rotational and vibrational effects, paramagnetic resonance, chemical binding. (Spring 1975 and alternate springs)

243 **Solid State Physics: Structure and Binding** (3) Staff

Atomic structure of solids and analysis of the binding of crystals. Crystalline forms and symmetries, atomic vibrations and specific heats, sound and optical propagation, crystalline defects. (Fall 1975 and alternate falls)

244 **Solid State Physics: Electronic Processes in Metals** (3) Staff

Phenomena in metals and semi-conductors determined by the electronic states allowed: binding, specific heats, magnetic properties, transport phenomena. Independent particle approximation and many-body aspects are discussed. (Spring 1976 and alternate springs)

245 **Quantum Electrodynamics: Theory and Applications** (3) Staff

A presentation of the lower order effects depending upon the quantal nature of the electromagnetic field: Hamiltonian formulation and field quantization, perturbation calculations, Compton effect, photoelectric effect, electron-electron scattering, pair creation and annihilation, indices of refraction, divergence difficulties. (Fall 1974 and alternate falls)

246 **Quantum Field Theory** (3) Staff

Covariant presentation of general theory of quantized fields, Boson and Fermion fields, theory of S-matrix, dispersion relations, and renormalization program. (Spring 1975 and alternate springs)

247 **Nuclear Theory** (3) Staff

Nuclear interactions, nuclear models, theory of nuclear reactions, pion physics and weak interactions. (Spring 1976 and alternate springs)

248 **Elementary Particles** (3) Staff

Scalar, vector, and spinor fields and their particle aspects; weak and strong interactions; symmetry properties and conservation laws. (Spring 1976 and alternate springs)

249 **Statistical Processes** (3) Staff

Extension of statistical concepts to irreversible processes. Ergodic behavior, classical and quantum approaches to irreversible effects in large systems, master equations, recurrence paradox and development of thermodynamic concepts. (Fall 1974 and alternate falls)

250 **Selected Topics in Modern Physics** (3) Staff

Complements the established curriculum by affording formal instruction in topics of immediate interest to the development of physics and in particular to the members of the graduate research group. May be repeated for credit with permission of graduate adviser. (Fall and spring)

251–52 **Laboratory** (3–3) Staff

Individual work on special topics. Laboratory fee, $11 a semester. (Academic year)

254 **General Theory of Relativity** (3) Staff

Physical principles and mathematical methods underlying Einstein's field equation, geodesic equations of motion, checks of the theory, action principle, conservation laws, perturbation theory, gravitational radiation theory, relativistic cosmology. (Spring 1976 and alternate springs)

291 **Seminar** (1) Staff

Lectures on special problems in physics. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Physiology

Professors C.S. Tidball, R.A. Kenney (*Chairman*), Elizabeth Tidball, Marie Cassidy
Professorial Lecturer Leonard Laster
Associate Professors M.J. Jackson, Michael McCally
Assistant Professors R.A. Lavine, D.W. Watkins
Assistant Professorial Lecturers I.P. Weiss, E.A. Steane
Special Lecturer L.L. Langley

Master of Science in the field of Physiology.—Prerequisite: a Bachelor's degree. No major is specified, but the undergraduate program must have included the following courses or equivalent: B Sc 11–12; Chem 11–12, 22, 151–52, 153–54; Math 31; Phys 1, 2.

Required: the general requirements, pages 90–97. In addition to the thesis, the 30 hours of required work should include Phyl 201, 221, 298, and at least 3 semester hours of research (Phyl 295).

Doctor of Philosophy in the field of Physiology.—Required: the general requirements, pages 90–94, 97–99. The program of study includes a major field in Physiology, a subfield (page 389) in Physiology, and a minor field outside of Physiology

leading to the Cumulative Examination. The 48 semester hours of required course work leading to the Cumulative Examination should include Bioc 221–22; Phyl 201, 221, 298, 396, 397; and a minimum of 8 semester hours each in two areas outside of Physiology in addition to the minor field.

Research fields and areas of study: Applied Physiology, Cardiovascular Physiology, Cellular Physiology, Endocrine Physiology, Gastrointestinal Physiology, Neurophysiology, Renal Physiology, and Respiratory Physiology.

Departmental prerequisite: Phyl 201 or equivalent is prerequisite to all courses in Physiology numbered above 201.

191 **Selected Topics in Human Structure and Function** (3) Kenney

Lecture (2 hours), laboratory (1 hour). Structural and functional basis of physiology. A required course for graduate students who have not had Anat 201 or equivalent. An undergraduate course; students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: B Sc 11–12 or equivalent and consent of instructor. Open to Columbian College of Arts and Sciences students with the approval of the student's major adviser. (Fall)

201 **Physiology** (8) Staff

Lecture (8 hours), laboratory (2 hours), conference (1 hour). Cellular, organ system, and applied mammalian physiology. Prerequisite for graduate students: Anat 201 or Phyl 191, or equivalent; Bioc 201 or 221–22 (Bioc 222 may be taken concurrently); or consent of Chairman of Department. Open to Consortium students only with permission of Department Chairman. (Spring)

221 **Seminar** (1) Cassidy

Staff and student presentations from literature. Present work discussed, experimental design and scientific deduction evaluated. Topics to be announced. Prerequisite: a reading knowledge of French or German. Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

251 **History of Medicine** (1) E. Tidball

Survey of the great contributors to physiology and medicine in the context of the times in which they lived and worked. (Fall)

252 **Physiological Basis of Sexuality** (2) C. Tidball, E. Tidball

Conference and discussion on topics including communication, psychosexual development, physiological responses, homosexuality, population control and family planning, fertility and sterility, etc. (Fall)

253 **Physiology of Fluid Balance and Hydrogen Ion Regulation** (2) Cassidy

Discussion on principles of fluid and acid-base balance and the application of these principles to scientific situations. (Fall)

261 **Gastrointestinal Physiology** (1 or 2) Jackson, Dobbins*

Weekly seminar; role of basic sciences in gastroenterology; intra- and extra-mural speakers. An approved paper required for 2 semester hours of credit. May be repeated for credit. (Fall and spring)

* Dr. W.O. Dobbins III is Professor of Medicine, School of Medicine and Health Sciences.

262 **Topics in Cardiovascular Physiology** (2) Kenney

Survey, at an advanced level, of aspects of cardiovascular physiology especially as interrelated with the respiratory and renal systems. (Fall)

265 **Review of Endocrinology** (1) Jackson

Review of basic endocrinology. (Fall)

266 **Advanced Endocrinology** (2) Jackson

Review at advanced level of selected topics in endocrinology and metabolism. Concurrent registration in Phyl 265 required. (Fall)

267 **Renal Physiology** (2) Kenney

Lecture or conference 2 hours a week. Overview of renal physiology at advanced level.

268 **Computer Utilization in Physiology and Medicine** (2) C. Tidball

Lecture 1 hour a week, practical experience at student's convenience. Orientation to digital and analog mini-computers. Programming in several languages. Experience with one or more computers. No previous computer experience necessary. (Fall)

269 **Neurophysiology and Control Mechanisms** (2) Lavine

Selected topics in contemporary neurophysiology, including methods of data collection and analysis, control mechanisms involved in movement and behavior and sensory processing. Open to students in the School of Engineering and Applied Science with permission of instructor. (Fall)

295 **Research** (arr.) Staff

By special arrangement with individual Staff members. Approximately 4 clock hours in the laboratory for each semester hour of credit. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

298 **Comprehensive Physiology** (arr.) Staff

Guided review of selected areas of Physiology appropriate to the student's graduate program. This course satisfies the requirements for the Master's Comprehensive Examination, the Field Examination for doctoral students minoring in Physiology, and Part I of the Cumulative General Examination. Prerequisite or concurrent registration: Phyl 221. (Fall)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

396 **Advanced Reading and Research** (2) Staff

Limited to students preparing for the Doctor of Philosophy general examination. Tutorial literature survey of a subfield of Physiology and of pertinent areas of the candidate's minor field. This course satisfies the requirement for Part II of the Cumulative General Examination in Physiology. (Fall and spring)

397 **Development of Dissertation Problem** (2) Staff

Limited to students preparing for the Doctor of Philosophy general examination. Preparation for written and oral presentation of dissertation problems. This course satisfies the requirement for Part III of the Cumulative General Examination in Physiology. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Political Science

Professors R.E. Purcell, H.L. LeBlanc (*Chairman*), Benjamin Nimer, Andrew Gyorgy, H.C. Hinton, B.M. Sapin, J.A. Morgan, Jr.
Associate Professors C.F. Elliott, Bernard Reich, Young Kim, C.A. Linden, S.J. Wayne, J.M. Logsdon
Adjunct Associate Professor Donald Robinson
Assistant Professors R.E. Darcy, J.M. Starrels, S.W. Burks, H.R. Nau, R.L. Cole, Dana Fischer
Adjunct Assistant Professor K.L. Storrs
Instructor Rachel Keith

Bachelor of Arts with a major in Political Science (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—P Sc 4 and 6 or 5 and 6; Stat 51 or 53. (12 semester hours of introductory foreign language courses are recommended for students interested in political theory, comparative government, or international relations.)
3. Required courses in related areas—18 semester hours of social studies other than Political Science, including 6 hours of either Economics or History.
4. Required courses in the major—30 semester hours of second-group Political Science courses which must include 6 semester hours from each of Groups A, B, C, and D listed below. The 6 hours from Group A must include P Sc 105 (which should be taken no later than the second semester of the junior year); the 6 hours from Group B must include P Sc 103 or 104 or 122 or 145; the 6 hours from Group C must include P Sc 111 or 112; the 6 hours from Group D must include P Sc 171 or 172 or 181.

Group A: Political Theory and Methodology—P Sc 105, 107, 117–18, 119–20, 141, 160; *Group B:* American Government and Politics—P Sc 103, 104, 106, 108, 121, 122, 125, 126, 145, 146, 149, 150, 151, 167, 183–84, 185–86, 199, SPSc 154, 155; *Group C:* Comparative and Foreign Government and Politics—P Sc 101, 111, 112, 115, 162, 163, 177, 180, 190, 191, 192, 193, 194; *Group D:* International Politics, Law, and Organization—P Sc 171, 172, 178, 179, 181, 189, 197.

A student majoring in Political Science may not credit more than 12 hours of either Service-Learning courses or internships with their associated seminars toward his degree; no more than 6 hours of such courses may be credited toward the major.

Students in the 90-semester-hour degree program (see page 82) must receive grades of *A* in at least 18 semester hours of second-group Political Science courses.

Political Science majors may apply for graduation with Special Honors. In order to be recommended by the Department for Special Honors, students must fulfill the general requirements (see page 48) and must complete with distinction a project of independent study, as demonstrated in a written paper, in addition to the normal credit requirements of particular courses. A committee of the Department will review the paper and make the recommendation for Special Honors.

Students who wish to undertake independent study for Special Honors should register with the secretary of the Department *no later than the second week of each semester*, and then consult with a member of the Department whose specialized interests lie in the area of the proposed research project. Students registered for P Sc

150 may qualify for graduation with Special Honors by completing with distinction the work connected with their internship.

Master of Arts in the field of Political Science.—Prerequisite: a Bachelor's degree with a major in Political Science from an accredited college or university (or an equivalent degree), with high scholastic standing. The entering student must demonstrate competence in statistics equivalent to the satisfactory completion of an introductory course in Statistics.

Required: the general requirements, pages 90–97, including a reading knowledge of a modern foreign language or a specified level of knowledge in statistics. The choice of the foreign language, or of statistics in lieu of a language, must be made with the approval of the Department. With the approval of the Department, students may elect one of the following programs: (1) 24 semester hours of graduate course work plus a thesis (equivalent to 6 semester hours) and the satisfactory completion of a Master's Comprehensive Examination in three fields of political science (selected from the areas of study listed below under the Ph.D. program); or (2) 33 semester hours of graduate course work, including two research seminars (equivalent to 6 semester hours) without a thesis and the satisfactory completion of a Master's Comprehensive Examination in four fields of political science (selected from the areas of study listed below under the Ph.D. program).

Students in either the 30- or 33-semester-hour program must include in their program of study P Sc 201 during the first semester of graduate study unless by a waiver examination they can demonstrate equivalent knowledge of the subject matter of the course.

Doctor of Philosophy in the field of Political Science.—Entering students must have a knowledge of statistics equivalent to the satisfactory completion of an introductory course in Statistics. An otherwise qualified student should satisfy this requirement as early as possible.

Required: the general requirements, pages 90–94, 97–99, including (1) a reading knowledge of two modern foreign languages, or a reading, writing, and speaking proficiency in one modern foreign language, or a reading knowledge of one modern foreign language and a specified level of knowledge in statistics, and (2) the satisfactory completion of examinations in a major and a minor field of study, which constitute the General Examination.

Each student must include in his program of study P Sc 201, 202, and 207 unless by a waiver examination he can demonstrate equivalent knowledge of the subject matter of the courses.

Major and Minor Fields of Study: Each student has a major and a minor field of study chosen from four principal *subject-matter* divisions of the discipline—Theory and Methodology, International Relations, Comparative and Foreign Politics, and American Politics.

Sub-fields of Study: Each subject-matter division includes several sub-fields of study (see below) from which the student constructs his program in consultation with his adviser. A major field of study consists of *three* sub-fields; a minor field consists of *two* sub-fields.

Fields of Study: Theory and Methodology (Analysis of Western Political Thought, Analysis of Marxist and Marxist-Leninist Thought, Scope and Methods of Political Science, Quantitative Political Analysis); Comparative and Foreign Politics (Comparative Political Analysis, Regional Comparative Politics, Domestic Politics of a Specified Major Political System); International Relations (International Politics, International Law, Regional International Relations, Foreign Relations of a Specified Major Political System); American Politics (American Political Process, National Policy-making Process, American Constitutional Law and Judicial Process, and State, Local, and Urban Politics).

Doctor of Philosophy fields of study in International Relations combine work in Economics, History, and Political Science.

Departmental prerequisite: P Sc 4 and 6 or 5 and 6 are prerequisite to all second-group courses in Political Science and Service-Learning Political Science.

POLITICAL SCIENCE

FIRST GROUP

4 **Introduction to Political Science** (3) Darcy

Study of political behavior, including the role of politics in today's world, the sources of elite and mass political behavior, and the influence and nature of political institutions. Students who receive credit for P Sc 4 cannot receive credit for P Sc 5. (Fall)

5 **Introduction to Political Science** (3) Staff

Introduction to the study of comparative political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies. Students who receive credit for P Sc 5 cannot receive credit for P Sc 4. (Fall and spring)

6 **Introduction to Political Science** (3) Staff

Introduction to the study of the structure, powers, and processes of the American political system. (Fall and spring)

SECOND GROUP

101 **Far East in the Modern World** (3) Michael

General character of Far Eastern societies and their response to the impact of America, Europe, and Russia; American policy in the Far East and the influence of world communism. (Fall)

103 **State Politics** (3) Cole

Theory and practice of American federalism, factors influencing state policy choices, state responsiveness to urban problems. (Fall)

104 **Urban Politics** (3) Burks, Cole

Demographic trends and implications, local metropolitan political systems, issues in urban politics, strategies of political change. (Spring)

105 **Scope and Methods of Political Science** (3) Wayne, Kim, Darcy, Cole

Nature of political inquiry, approaches to the study of politics and government, empirical methods of research. Prerequisite: Stat 51 or 53; or equivalent. (Fall and spring)

106 **The Politics of Social Change** (3)

Theories of revolution and change; protest in American politics; urban violence and political change; institutional innovation, reform, and responsiveness; realistic and unrealistic strategies of change. (Fall)

107 **Issues in Modern Political Thought** (3) Linden

Issues of modern political thought as seen through major representative thinkers. Emphasis on conservative, liberal, and radical thought.

108 **Science, Technology, and Politics** (3) Logsdon

Examination of the multiple impacts of scientific and technological de-

velopments on the political system. Discussion of public policies for the support, use, and control of science and technology. (Fall)

111 **Comparative Government and Politics** (3) Kim, Elliott, Gyorgy
Government and politics of the principal constitutional democracies of Western Europe. (Fall and spring)

*112 **Comparative Government and Politics** (3) Elliott, Gyorgy, Hinton
Government and politics of the communist nations; emphasis on the Soviet Union and the countries of Eastern Europe. (Fall and spring)

*115 **Government and Politics in Eastern Europe** (3) Gyorgy
Study of the contemporary social and ethnic structures, governmental systems, and international position of the Eastern European states within the Soviet system.

117–18 **Political Theory: Major Issues of Western Political Thought** (3–3) Linden, Fischer
P Sc 117: foundations of Western political thought—Plato to Aquinas. P Sc 118: philosophical roots of modern political order and disorder—Machiavelli to Rousseau. (Academic year)

119–20 **American Political Thought** (3–3) Staff
Introduction to political thought in the United States from colonial times to the present. (Academic year)

121–22 **U.S. Constitutional Law and Politics** (3–3) Morgan
P Sc 121: separation of powers, federal-state relationships, economic regulation. P Sc 122: political and civil rights. Prerequisite: junior status. (Academic year)

125 **Legislative Process** (3) Darcy, Starrels
Study of Congress, including theories of representation, legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches. (Fall and spring)

126 **The American Presidency** (3) Wayne
Examination of the politics of Presidential selection, the authority of the contemporary institution, the mechanisms and processes for formulating public policy, and the influences of personality on performance in office. (Fall)

141 **Development of Legal Institutions** (3) Staff
Introduction to historical jurisprudence: primary attention to the origins of Roman Law of Continental Europe and of Anglo-Saxon Common Law. (Spring)

145 **U.S. Political Parties and Politics** (3) LeBlanc, Darcy
Party system and structure, role of ideology, voting behavior, campaigns and elections, devices for organizing the government. (Fall and spring)

* P Sc 112 and 115 are related in their subject matter, and credit for only one may be applied toward a degree.

146 **Public Opinion and Political Socialization** (3) Darcy

Sources of mass political attitudes and behavior; voting and political campaigning. Prerequisite: P Sc 105 or permission of instructor. (Spring)

149 **Readings on the U.S. Congress** (3) Robinson

Readings and group discussions of major writings on the structure and processes of the U.S. Congress. Open only to students who are enrolled in P Sc 150 or who have congressional work experience. Selection is by a Departmental committee. (Fall and spring)

150 **Internship in Politics** (3) Robinson

Study of the political process in action through assignment to a political or governmental office. Limited to selected juniors and seniors, with preference given to seniors majoring in Political Science. Seminar open to congressional workers. (Fall and spring)

151 **Public Administration and Public Policy-making** (3) Logsdon

Examination of the process by which the federal government selects and implements public policies. Particular attention to the role of bureaucracies in the policy-making process. Criteria for the evaluation of public policy. (Spring)

160 **Modern Communist Ideologies** (3) Elliott

Intensive study of modern communism; emphasis on its antecedents and possible evolution. Careers and ideas of leading figures: Marx, Lenin, Stalin, Khrushchev, and Mao. (Spring)

*162 **Government and Politics of China** (3) Staff

Analysis of the government and politics of China, including the Chinese tradition, modern Chinese history, Marxism-Leninism, and Soviet influence.

163 **Soviet Foreign Policy** (3) Elliott

Relations with United States, Third World, China; international communism; instruments of foreign policy; interrelationships of domestic and foreign policies; ideology and foreign policy. (Fall)

167 **U.S. Foreign Policy** (3) Purcell

Constitutional and political factors that determine the formulation, execution, and substance of U.S. foreign policy. (Fall)

171 **International Politics** (3) Starrels, Storrs

International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy. (Fall and spring)

172 **International Organizations** (3) Staff

Development and operations of the United Nations, regional organizations, and functional international organizations. (Fall and spring)

177 **Governments and Politics in Latin America** (3) Storrs

Political processes and institutions in Latin America; emphasis on Argentina, Brazil, Chile, and Mexico. (Fall)

* P Sc 162 and 194 are related in their subject matter, and credit for only one may be applied toward a degree.

178 **International Relations of Latin America** (3) Storrs
(*Formerly Latin America: Political Patterns and International Relations*)
U.S.-Latin American relations, inter-American diplomacy and organization, foreign policies of selected states, the Cuban revolution. (Spring)

179 **International Relations of the Middle East** (3) Reich
Analysis of the regional and international relations of the Middle East. (Spring 1976 and alternate springs)

180 **Israeli Foreign Policy** (3) Reich
Examination of the institutions, processes, and issues of Israeli foreign policy.

181 **Public International Law and Organization** (3) Fischer
Survey of international law; emphasis on development and trends. (Fall and spring)

183–84 **Senior Seminar: Urban Affairs** (3–3)
Readings and group discussions of major writings on urban political and policy-making processes. Primarily for senior Urban Affairs majors; others admitted by permission of instructor. (Academic year)

185–86 **Apprenticeship in Urban Affairs** (3–3)
Study of urban political and policy-making processes through assignment to an urban-related political or governmental office. Primarily for senior Urban Affairs majors; others admitted by permission of instructor. (Academic year)

189 **African International Politics** (3) Nimer
Analysis of interstate relations in Africa and of selected aspects of African relations with the outside world. Recommended but not required: P Sc 190 or equivalent. (Spring)

190 **Politics of Middle and Southern Africa** (3) Nimer
Comparative analysis of the political systems of selected countries of non-Mediterranean Africa. (Fall)

191 **Governments and Politics of the Middle East** (3) Reich
Domestic and international politics of the eastern Arab states, Turkey, Iran, Israel. (Fall)

192 **Governments and Politics of North Africa** (3) Reich
Domestic and international politics of Algeria, Tunisia, Morocco, Libya, Egypt, Sudan; their relations with states of the Middle East. (Spring)

193 **Governments and Politics of South and Southeast Asia** (3) Hinton
Domestic and international politics of the major states in the area. (Spring)

*194 **Governments of China and Japan** (3) Michael
Institutions and processes of government in contemporary China and Ja-

* P Sc 162 and 194 are related in their subject matter, and credit for only one may be applied toward a degree.

pan, with some historical background. Attention to ideological forces. (Spring)

196 **Methods of Public Policy Analysis** (3) Staff

Models and case studies of public policy formation and changes, techniques of policy analysis and evaluation, normative implications of alternative policy-making frameworks.

197 **Proseminar: International Affairs** (3 or 6) Purcell, Reich, Storrs

Substantive problems of U.S. foreign policy. Readings, term papers, discussion.

199 **American Government and Politics** (3) Staff

Reading and research on selected contemporary problems. Limited to juniors and seniors majoring in Political Science or Public Affairs. Admission by permission of instructor.

THIRD GROUP

Third-group Political Science courses are designed for graduate students who have appropriate second-group prerequisites.

201 **Scope and Methods of Political Science** (3) Wayne

Introduction to the discipline and the profession, analysis of the nature of political inquiry, discussion of conceptual approaches to the study of politics and government. (Fall)

202 **Modes of Political Inquiry** (3) Linden

Examination and comparison of some major modes of political thought. Analysis of discursive, systematic, philosophical, and scientific approaches. (Spring)

203 **State Politics** (3) Burks

Readings and discussions on developments in state politics research, changing roles in the federal structure, state political systems, governmental performance, policy innovation and change. (Fall)

204 **Urban Politics** (3) Burks

Readings and discussions on patterns and implications of urban growth, local and metropolitan political systems, policy formation and change, conflict management, political constraints on social reform. (Spring)

205 **Government, Science, and Technology** (3) Logsdon

Examination of the demands on national and international political systems resulting from the impact of scientific and technological developments and of the responses of governmental institutions and processes to these demands. (Fall)

206 **Science, Technology, and Public Affairs** (3) Logsdon

In-depth examination of selected domestic policy issues with significant scientific or technological aspects. Teams of students will prepare policy analyses on each issue discussed. (Spring)

207 **Empirical Political Analysis** (3) Darcy

Techniques of data gathering and analysis, the uses of data in political research. (Spring)

208 **Seminar: Science, Technology, and World Order** (3) Nau

Intensive reading, discussion, and research on the impact of science and technology on world order, in particular the claim that a new global politics is replacing traditional international or nation-state politics. (Spring)

210 **Advanced Topics in Empirical Political Analysis** (3) Staff

Advanced techniques of data collection and analysis; varying emphasis on such methods as causal modeling, analysis of variance, regression analysis, and simulation.

211–12 **Comparative Government and Politics** (3–3) Kim, Starrels

Problems of comparative political analysis; a comprehensive examination of the literature in comparative politics. (Academic year)

213–14 **Comparative Communist Systems** (3–3) Linden

Comparative study of the communist world and communist movements; examination of sources of unity and diversity as well as such issues as leadership, ideology, revisionism, nationalism, and reform. (Academic year)

215–16 **Seminar: the Communist Camp in World Politics** (3–3) Staff

Significant issues of communism, particularly in the Soviet Union and Red China; concept and structure of "world socialist system"; intra-Bloc relations with emphasis on the Sino-Soviet dispute.

217 **Readings in Political Theory** (3) Linden

Readings and discussions, principally on modern political and constitutional theory since the 17th and 18th centuries; emphasis on basic issues and schools of thought. (Fall)

219 **Seminar: Western European Politics** (3) Starrels

Comparative examination of major political system characteristics of France, England, and the two Germany's. Special attention devoted to political culture, socialization, recruitment, and communication. (Fall and spring)

221 **The United States Constitution and the Judicial Function** (3) Morgan

Lectures and group discussions on constitutional law and politics. (Fall)

224 **Readings in Socialism and Communism** (3) Elliott, Linden

Readings and discussions of works illuminating the evolution of pre- and post-Marxian socialism. (Fall)

227 **Seminar: Governments and Politics of Eastern Europe** (3) Gyorgy

Comparative study of Eastern European states: political, social, economic institutions; problems of regional integration and relations with outside powers. (Spring)

229 **Readings in Soviet Government and Politics** (3) Elliott, Linden

Readings in contemporary Soviet domestic government and politics. Prerequisite: 3 semester hours selected from Hist 146, P Sc 194; or equivalent. (Fall)

*231 **Seminar: Sino-Soviet Relations** (3) Michael

Background, development, and status of conflict within the communist movement; emphasis on the role of Chinese communists. Prerequisite: 3 semester hours selected from Hist 187; P Sc 101, 194; or equivalent. (Spring)

232 **Seminar: International Communications** (3) Staff

East-West perspectives. Theory and history of national patterns of international communications focusing on basic political and psychological aspects of communication between major communist and noncommunist powers. (Spring)

233 **Seminar: Soviet Government and Politics** (3) Elliott, Linden

Research seminar in selected problems of Soviet domestic government and politics. Emphasis: since Stalin. Prerequisite: P Sc 229 or permission of instructor. (Spring)

236 **Research Seminar: Intergovernmental Relations** (3) Staff

(*Formerly Research Seminar: Urban and Regional Problems*)

Analysis of the fiscal, structural, social, and political aspects of the evolving federal system; emphasis on metropolitan government.

245 **The American Political Process** (3) LeBlanc

Lecture and discussion on the nature and functions of political parties, interest organizations, and other political groupings in the American political system. (Fall)

246 **American Policy-making Process** (3) Wayne

Lecture and discussion on the structure and processes for formulating public policy at the national level. Emphasis on interaction between executive and legislative branches. (Spring)

253 **Seminar: Chinese Government and Politics** (3) Michael

Political institutions and concepts in late imperial times, during the revolution, under national government, and under communism. Emphasis on the communist period. (Fall)

254 **Colloquium: East Asia** (3) Michael

Interuniversity research colloquium of faculty members concerned with the study of China, Japan, and Korea. Advanced graduate students admitted with permission of faculty group. (Fall and spring)

255 **Colloquium: Russia and Eastern Europe** (3) Gyorgy

Interuniversity research colloquium of faculty members concerned with the study of Russia and Eastern Europe. Advanced graduate students admitted with permission of faculty group. (Fall and spring)

257–58 **Seminar: Communism in Developing Countries** (3–3) Staff

Examination of international communist policy for, and communist parties in the noncommunist world. (Academic year)

265–66 **Chinese Communist Policy Processes** (3–3) Hinton

Introduction to the literature and to graduate research in contemporary

* An interdepartmental course offered by the departments of Political Science and History.

Chinese politics. P Sc 265: readings and group discussion. P Sc 266: research seminar. (Academic year)

267 **Seminar: U.S. Foreign Policy** (3) Purcell

Research and selected reading as the basis for an analysis of the foreign policy of the United States, with particular reference to the decision-making process and the execution of policy. (Fall)

268 **Seminar: Comparative Foreign Policies** (3) Staff

Research and selected reading as the basis for an analysis of the foreign policies of major powers, with particular reference to the decision-making process and the execution of policy. (Spring)

269 **Seminar: Soviet Foreign Policy** (3) Elliott

External policies and relations of the USSR; relations with other communist states, Western powers, and other countries. (Spring)

270 **Political and Social Institutions of Eastern Europe** (3) Gyorgy

Major political and social factors which have shaped the inter-war, World War II, and post-war evolution of Eastern Europe; emphasis on selected countries. (Fall)

271–72 **Problems in International Organizations** (3–3) Nau

P Sc 271: analysis of the political dimension of international organizations; special reference to the United Nations. P Sc 272: examination of the operational and administrative aspects of international organizations, special reference to regional and functional bodies. (Academic year)

273 **Public Opinion and Foreign Policy** (3) Purcell

Development, organization, and operation of international information programs by major world powers. U.S. public opinion influencing foreign policy formation and conduct. (Spring)

274 **Principles and Problems of International Political Communication** (3) Staff

Reading and discussion of public opinion/foreign policy relationships and operation of international political communication programs by major world powers as a tool of foreign policy. (Spring)

275 **Theories of International Politics** (3) Nimer, Storry

Critical examination of contemporary theories, both empirical and normative. (Fall)

276 **Topics in International Politics** (3) Nimer, Storry

Reading, research, and discussion of selected structural and procedural aspects of international political relations. (Spring)

277–78 **Seminar: Latin American Politics** (3–3) Storry

P Sc 277: readings and discussions on Latin American political processes and institutions. P Sc 278: individual research and class discussion on selected topics of Latin American politics. (Academic year)

279 **Seminar: International Relations of the Middle East** (3) Reich

Reading and research on the regional and international relations of the states of the Middle East. (Spring 1976 and alternate springs)

281 **Seminar: International Law** (3) — Fischer

Readings and research in selected areas of international law. (Fall)

287 **Seminar: Problems in Latin American Civilization** (3) — Staff

Interdisciplinary seminar partially guided by a specialist in the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

288 **Seminar: Soviet Military Policy and Strategy** (3) — Wolfe

Soviet developments in military policy and strategy with attention to intra-Bloc military cooperation, political context of Soviet military policy, significant changes in recent Soviet military thought. (Fall or spring)

290 **Topics in African Politics** (3) — Nimer

Reading, research, and discussion of selected aspects of African domestic and international politics. (Spring)

291 **Governments and Politics of the Middle East** (3) — Reich

Reading and research in selected problems in the governments and politics and international relations of the Middle East. (Fall)

292 **Governments and Politics of North Africa** (3) — Reich

Reading and research in selected problems in the governments and politics and international relations of North Africa. (Spring)

293 **Seminar: Governments and Politics of South and Southeast Asia** (3) — Purcell

Research and selected reading as basis for analysis of structure, problems, and policies of the governments of selected countries in the area, with particular reference to India. (Spring)

294 **Seminar: Governments and Politics of Japan and Korea** (3) — Staff

Readings, research, and discussion on the contemporary political problems and relevant historical background of Japan, North and South Korea. (Fall or spring)

295 **Seminar: Chinese Communist Foreign Policy** (3) — Hinton

Objectives; formulation and implementation; Communist China as Asian state, revolutionary influence, would-be great power. Prerequisite: 3 semester hours selected from P Sc 101, 194; or equivalent. (Spring)

296 **The Communist Role in Far Eastern International Politics** (3) — Hinton

Evolution of communist Asian strategy, development of Asian communist states and parties, role in international politics and crises, Sino-Soviet rivalry. (Fall)

297 **Independent Study** (arr.) — Staff

Limited to Master's degree candidates. Permission of instructor, in writing, required. (Fall and spring)

298 **Southeast Asia in World Politics** (3) — Staff

Southeast Asia in great-power perspective. Balance-of-power concept and development of Asian subsystem. (Spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

Fourth-group Political Science courses are designed for graduate students who have appropriate third-group prerequisites. Offered as the demand requires.

307 **Political Parties** (3) LeBlanc
Advanced readings, group discussions, and research.

308 **Public Opinion and Political Socialization** (3) Darcy
Advanced readings, group discussions, and research.

309 **The American Presidency** (3) Wayne
Advanced readings and group discussions.

310 **American Legislatures** (3) Staff
Advanced readings and group discussions.

311 **Comparative Government and Politics** (3) Kim, Starrels
Advanced readings and group discussions.

312 **Seminar: Comparative Government and Politics** (3) Kim, Starrels
Advanced research.

318 **Normative Political Theory** (3) Fischer, Linden
Advanced readings and group discussions.

325 **Research Seminar: Topics in Marxism-Leninism** (3) Elliott, Linden
Advanced research.

345 **American Politics** (3) LeBlanc, Darcy
Advanced research.

346 **American Government** (3) Wayne, Morgan
Advanced research.

375 **International Politics** (3) Nimer, Storrs, Reich
Advanced readings and group discussions.

376 **Seminar: International Politics** (3) Nimer, Storrs, Reich
Advanced research.

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

SERVICE-LEARNING POLITICAL SCIENCE

SECOND GROUP

154 Law and Social Change (6) — **Staff**

Study of the legal system and its role in promoting social change. Readings, group discussions, and work with lawyers and 3rd-year law students. (Fall and spring)

155 American Political Behavior (6) — **Keith**

Internships in a variety of lobbying groups. Analysis of the structural and behavioral limitations which confront those who wish to exercise political influence. (Fall and spring)

Portuguese

See "Romance Languages and Literatures."

Psychology

Professors Thelma Hunt (*Emeritus*), E.L. Phillips, J.N. Mosél, B.I. Levy, W.E. Caldwell, R.D. Walk (*Chairman*), R.K. White (*Emeritus*), Gardner Murphy (*Visiting*), M.L. Meltzer, A.D. Kirsch, Eva Johnson
Adjunct Professor Rose Caron
Professorial Lecturers B.M. MacLennan, R.K. Kahn, W.A. McClelland
Associate Professors C.E. Tuthill, Virginia Kirkbride, R.H. Tanck (*Research*), D.E. Silber, Charles Rice, Eugene Abravanel, S.A. Karp, R.W. Holmstrom, C.J. Lange
Adjunct Associate Professor Devra Kleiman
Associate Professorial Lecturer S.L. Cohen
Assistant Professors J.A. Bull III, L.A. Rothblat, P.J. Poppen
Adjunct Assistant Professor Elyse Lehman
Assistant Professorial Lecturer Sally Sibley

CLINICAL TRAINING STAFF

Professorial Lecturer Nathene Loveland
Associate Professor J.J. McMillan
Associate Clinical Professors I.M. Zimmerman, Bruce Becker, J.W. Cummings, Mimi Spielberg, Meira Zedek, Elliot Blum, Phyllis Daen, Rochelle Kainer
Assistant Clinical Professors Alice Adams, Patricia Crowe

Bachelor of Arts with a major in Psychology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.

2. Prerequisite courses—7 or 8 semester hours selected from Psyc 1, 5, and 6.
3. Required courses in related areas:

(a) 3 semester hours selected from Stat 51, 53, or any first-group course in Mathematics except Math 6. (Students expecting to do graduate study in Psychology should elect Stat 53.)

(b) 12 semester hours selected from American Civilization, Anthropology, Economics, Geography and Regional Science, History, Philosophy (Phil 71, 113, 151 recommended), Political Science, or Sociology, of which 6 hours must be from *one* of the following: Anthropology, Economics, History, Political Science, or Sociology. If a student takes more than 6 hours in any one department, the excess will be credited to electives.

4. Required courses in the major—24 semester hours in second-group Psychology courses, including Psyc 196 and one course from each of the following groups—*Group A:* Psyc 118, 121, 161; *Group B:* Psyc 115, 144, 151, 156; *Group C*: Psyc 101, 112, 129, 131.

Although there is no foreign language requirement, students contemplating graduate study are reminded that most graduate schools require knowledge of one and sometimes two foreign languages.

Master of Arts in the field of Psychology.—Prerequisite: the degree of Bachelor of Arts with a major in Psychology at this University, or an equivalent degree. Admission to the program is limited; preference will be given those who plan to continue toward a Doctor of Philosophy degree.

Required: the general requirements, pages 90–97. Of the 24 required semester hours (exclusive of the thesis), a minimum of 8 must be in third-group Psychology courses including Psyc 202 and either 203 or 204; 6 may be in related fields approved by the Department. For detailed requirements consult the Chairman of the Department.

Doctor of Philosophy in the field of Psychology.—Prerequisite: the degree of Bachelor of Arts with a major in Psychology. Students admitted from other disciplines will be expected to complete prerequisite undergraduate courses to prepare for graduate study in Psychology. Qualifying scores on the Miller Analogies Test and the Aptitude Test of the Graduate Record Examination are required for admission.

Required: the general requirements, pages 90–94, 97–99, including (1) the satisfactory completion of the tool requirement (see pages 97–98); (2) Psyc 202, 203–4, Stat 105; and (3) the satisfactory completion of two Comprehensive Examinations (one in general psychology, one in the major field of specialization).

Areas of study: Clinical, Developmental, Experimental, Industrial and Organizational, Personality Psychopathology, and Social Psychology.

Students electing Psychology courses in the freshman year should begin with Psyc 1; with permission of instructor students may elect Psyc 5–6 in the freshman year.

Departmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses in Psychology. Six semester hours in Psychology courses are prerequisite to all second-group courses in Psychology. The departmental prerequisite may be waived with the permission of the instructor.

FIRST GROUP

1 General Psychology (3) Staff

Fundamental principles underlying human behavior. (Fall and spring)

5–6 **Principles and Methods of Psychology** (4–4) Walk, Bull

Lecture (3 hours), laboratory (3 hours). An experimental approach to understanding behavior; individual and class experiments performed. Psyc 5: sensation, perception, and emotions and their relation to adaptive behavior. Psyc 6: topics of motivation, learning, memory, and problem-solving. Laboratory fee, $6 a semester. (Academic year)

8 **Psychology of Motivation and Personality** (3) Tuthill, Silber, Rice, Holmstrom

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized. (Fall and spring)

22 **Introduction to Educational Psychology** (3) Kirkbride, Tanck, McClelland

The contributions of psychology to education; emphasis on learning. (Fall and spring)

29 **Psychology of Childhood** (3) Johnson

Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world. (Fall and spring)

SECOND GROUP

101 **Abnormal Psychology** (3) Meltzer, Silber, Holmstrom

Causes, diagnosis, treatment, and prevention of various types of maladjustments and mental disorders. Prerequisite: 6 semester hours in psychology, or 3 in psychology and 6 in a biological science. (Fall and spring)

104 **Ecology and Mental Health** (3) Karp

Examination by field research of the linkages between aspects of the physical environment and mental health. (Fall)

105 **The Psychology of Consumer Behavior and Attitudes** (3) Phillips

Consumer behavior and attitudes in regard to advertising, buying habits, consumer action groups and social pressures, and mass persuasion. Lectures and field work. (Spring)

110 **Cognitive and Perceptual Development** (3) Abravanel

Concepts and research in the area of developmental psychology; emphasis on the growth and development of perception, cognition, and language. (Spring)

112 **Psychology of Adolescence** (3) Johnson

Psychological characteristics and problems peculiar to adolescence, with emphasis on application of psychology to solution of such problems. (Fall)

115 **Psychology of Language and Communication** (3) Mosél

Introduction to psycholinguistics and verbal behavior. Information theory, generative grammar theory, cultural and linguistic structures in the perception and learning of language. (Fall and spring)

117 **Psychology of Art and Picture Perception** (3) Walk

Theories of Arnheim, Gibson, Gombrich, and Goodman as related to art and picture perception; study of cross-cultural research and research with children.

118 **Neuropsychology** (3) Rothblat

Anaylsis of neural processes underlying behavior. Basic structure and functions of the nervous system, with emphasis on sensory processes, learning and memory, motivation, and emotion. (Fall and spring)

121 **Psychology of Learning** (3) Bull

Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects. (Fall)

122 **Psychology and Human Relations** (3) Silber

Understanding human relations and T-group techniques by evolving an on-going T-group within the course itself. For junior and senior undergraduate social science majors; open to others with permission of instructor.

129 **Theories of Personality** (3) Kirkbride, Karp, Poppen

Survey of personality theories; emphasis on their application to problems of individuals. (Fall and spring)

131 **Psychological Tests** (3) Hunt, Karp, Holmstrom

Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7. (Fall and spring)

135–36 **Seminar: Community Mental Health** (3–3) Levy, Meltzer

Survey of issues and techniques in community mental health; emphasis on educational systems and community mental health in the schools. Involves practicum work in school setting. Participation both semesters expected. Open to juniors and seniors with permission of instructor. Prerequisite to Psyc 136: Psyc 135. (Academic year)

144 **Personnel and Industrial Psychology** (3) Mosél

Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation, and productivity. (Fall and spring)

150 **Psychology of Sex Differences** (3) Poppen

Relevant biological, psychological, and sociological influences on males and females in the development of sex differences: hormonal differences, gender identity, differential socialization of sons and daughters, masculinity/femininity, cultural evaluation of male and female roles. Survey of relevant psychological theory. Emphasis on empirical research and hypothesis testing. Admission by permission of instructor.

151 **Social Psychology** (3) Tuthill, Poppen

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war. (Fall and spring)

156 **Psychology of Attitudes and Public Opinion** (3) Tuthill

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare. (Spring)

161 **Comparative Psychology** (3) Caldwell

Lectures and demonstration on animal psychology. Psychological processes in infrahuman organisms, evolution of behavior, the place of animal experimentation and research in psychology. (Spring)

170 **Clinical Psychology** (3) Levy

An exploration of the history, functions, and problems of the clinical psychologist. Assessment, treatment, community approaches, ethics. Prerequisite: Psyc 101, 131. (Spring)

191 **Independent Research in Psychology** (3) Staff

Opportunity for work on individual library or experimental projects. Open to qualified students by permission; arrangements must be made with the sponsoring faculty member prior to registration. May be repeated once for credit. (Fall and spring)

192 **Field Experience in Psychology** (3) Abravanel, Levy

Selected senior psychology majors will spend a minimum of 6 hours a week in a local hospital, school, or community setting. Students registering for this course must have the approval of the instructor by May 15 for the fall semester and by December 15 for the spring semester. (Fall and spring)

196 **History and Systems of Psychology** (3) Caldwell, Rice

Senior capstone course which includes a survey and integration of the major viewpoints and concepts of psychology. Required of Psychology majors. (Fall and spring)

198 **Current Research Issues in Psychology** (3) Staff

Conducted as a seminar. Recent experiments in psychology, including those performed by members of the class; emphasis on student participation. May be repeated for credit. (Spring)

THIRD GROUP

Third-group courses are limited to graduate students in Psychology, except by special permission of instructor.

202 **Psychological Research Methods and Procedures** (3) Abravanel, Bull, Silber

Required in all graduate Psychology programs. Prerequisite: graduate standing, a laboratory course in psychology, and an elementary course in statistics. (Spring)

203–4 **Experimental Foundations of Psychology** (3–3) Bull, Rothblat

Required of doctoral students in Psychology during first year of study. Psyc 203: basic issues in learning and motivation. Psyc 204: physiological processes; sensation and perception. (Academic year)

205 **Research Methods in Intervention Programs** (3) Karp

Special problems of conducting research in a clinical setting; emphasis

on content and method of studies designed to assess effects of therapeutic intervention. Prerequisite: Psyc 202. (Fall)

206 **Methods of Clinical and Personality Research** (3) Rice

Review of techniques especially relevant to research in clinical, personality, and social psychology. Scaling methods, multivariate techniques, introduction to the use of computers in data analysis. Prerequisite: Psyc 202; Stat 105 or equivalent. (Spring)

207–8 **Psychological Assessment** (3–3) Holmstrom, Levy, Meltzer, Silber

Open only to clinical graduate students in the Department of Psychology. Theoretical and clinical aspects of assessment; includes interviewing, psychometric tests, and projective techniques. Two-hour laboratory—diagnostic work at clinical facilities. Material fee, $7 a semester. (Academic year)

209 **Seminar: Psychology of Motivation** (3) Caldwell

Various theoretical approaches to the psychology of motivation; systematic concepts and experimental findings deriving from each approach. (Spring)

211 **Assessment of Cognitive Functioning** (3) Levy

Concepts of intelligence and achievement and their assessment through a variety of group and individual procedures. Emphasis on evaluation of children. Material fee, $7. Admission by permission of instructor.

212 **Personality Assessment by Projective Techniques** (3) Levy

Methods of personality assessment, including psychometric and projective tests. Material fee, $7. Admission by permission of instructor.

213–14 **Seminar: Developmental Psychology** (3–3) Abravanel, Walk, Lehman

Psyc 213: research and theory in developmental psychology, emphasis on perceptual and cognitive development; consideration of the development of social awareness and of genetic-biological growth processes. Psyc 214: current research and theory in perceptual and cognitive development, intensive study of selected research problems. (Academic year)

215 **Personality Assessment by Multiple Procedures** (3) Meltzer

Consideration and use of a wide range of procedures in assessment of personality and psychopathology of children. Prerequisite: Psyc 207–8 or 211 and 212. Graduate students in fields other than Psychology admitted by permission of instructor. Material fee, $7.

216 **Psychological Assessment by Graphic Means** (3) Levy

Examination of graphic procedures for assessment of intelligence and personality; clinical use and evidence of validity. Common interpretive principles sought. Human figure drawings and free paintings as examples. Admission by permission of instructor. (Fall)

218 **Seminar: Systems of Psychotherapy** (3) Silber

Introduction to theory and technique of psychotherapeutic approaches: psychoanalytic, ego-centered, nondirective, transactional, and others. Original sources surveyed. Limited to graduate students in clinical psychology except when offered in Summer Sessions. (Spring)

220 **Seminar: Abnormal Psychology** (3) Meltzer

Study of selected problems. (Fall)

221–22 **Seminar: Group Psychotherapy** (3–3) MacLennan

For graduate students in the Department of Psychology; open to others, with permission of instructor, only when space permits. Psyc 221: didactic material and laboratory experience with emphasis on group dynamics and processes; survey of group therapy approaches. Psyc 222: supervised experience with therapeutic groups. Prerequisite to Psyc 222: Psyc 221. (Academic year)

223 **Seminar: Learning** (3) Bull

Selected topics of current research interest in the psychology of learning. (Spring)

226 **Seminar: Clinical Psychology of Childhood and Adolescence** (3) Johnson

Survey of behavior and personality disorders. (Spring)

227–28 **Seminar: Principles of Psychotherapy** (3–3) Kahn

For graduate students in clinical psychology; open to others, with permission of instructor, only if space permits. Patient's needs and demands on the therapist. Case participation heavily relied upon. Prerequisite: Psyc 218. (Academic year)

229 **Seminar: Principles of Behavior Change** (3) Phillips

Stimulus-organism-response variables and their interactions, with emphasis on learning theory as applied to clinical problems. (Fall)

230 **Seminar: Operant Applications to Clinical Problems** (3) Sibley

Examination of the broad role of reinforcement contingencies, behavior shaping, and other experimentally derived concepts as they apply to the management and control of a wide variety of human clinical problems. Prerequisite: Psyc 229. (Spring)

231 **Development of Psychometric Instruments** (3) Mosél

Quantitative techniques and principles used in construction, standardization, and evaluation of personality and ability measures for research and practice; quantification of human judgment for measurement purposes. Prerequisite: course in tests and measurements and an elementary course in statistics. (Fall)

234 **Seminar: Theory of Psychological Measurement** (3) Mosél

Development of classical axiomatic-deductive theory underlying major notions in the construction and evaluation of psychological tests. (Spring)

235–36 **Seminar: Community Mental Health** (3–3) Meltzer, Levy

For graduate students in the Department of Psychology; open to others, with permission of instructor, only if space permits. Survey of issues and techniques in community mental health; emphasis on educational systems and community mental health issues in the schools. Involves project in school setting. Prerequisite to Psyc 236: Psyc 235. (Academic year)

245 **Seminar: Organizational Behavior** (3) Mosél

Analysis of organizational behavior; emphasis on motivation and pro-

ductivity. Recent research on employee attitudes, primary group, supervisory leadership, formal and informal organization, job design. (Spring)

246 **Seminar: Personnel Measurement Techniques** (3) Mosel

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, and performance ratings.

251 **Seminar: Advanced Social Psychology** (3) Tuthill, Poppen

Current research and theory: motivation and cognition, dissonance, social interaction theory, authoritarianism, class differences, group dynamics, group conflict. (Fall)

252 **Research Methods in Social Psychology** (3) Tuthill, Poppen

Opinion and attitude survey techniques: interviewing, content analysis, report-writing, etc. (Spring)

254 **Seminar: Experimental Social Psychology** (3) Tuthill

Experimental study of small groups, group climates, interaction process analysis. Lewin's field-theoretical approach to individual and group processes. (Spring 1974 and alternate springs)

256 **Seminar: Psychological Causes of War** (3) White

An attempt to integrate evidence from animal behavior, child behavior, anthropology, psychiatry, and recent history, including World Wars I and II and the present East-West conflict. (Spring)

259 **Seminar: Social Psychology of Communism** (3) White

Public and governmental opinion in communist countries, authoritarian thinking, communist propaganda, problems of Western communication with communist countries. (Fall)

261 **Seminar: International Communication** (3) Mosel

Primarily for students in the schools of Government and Business Administration and Public and International Affairs. Communicating information and effecting attitude change across cultures by mass media. Psychocultural factors and the functions of mass communication in the development of transitional societies. (Spring)

272 **Seminar: Theories of Personality** (3) Caldwell

Emphasis on theoretical problems and methodology in the field of personality study. (Fall 1975 and alternate falls)

274 **Comparative Psychology and Ethology** (3) Caldwell

Synthesis of the principles and findings of ethology and comparative psychology. Examination of the theories and findings of Lorenz, Tinbergen and Jakob von Uexküll in the light of recent experimental investigations. (Fall 1974 and alternate falls)

283–84 **Practicum in Clinical Psychology** (3–3) Silber

Supervised practical instruction in agencies doing clinical psychological work; requires 64 full-time days during the year. Prerequisite: Psyc 212. Admission by permission of instructor. (Academic year)

289 **Seminar: Current Topics in Experimental Psychology** (3) Staff

Review and discussion of contemporary research and theory in a specialized field of psychological study, by leaders in the field. Independent topics each semester; may be repeated for credit. (Fall and spring)

290 **Seminar: Special Problems in Personality Research** (3) Murphy

Selected theoretically important and challenging contemporary research problems. May be repeated once for credit. (Fall and spring)

292 **Seminar: Perception** (3) Walk

Study of current research and theory in the experimental psychology of perception. (Spring 1975 and alternate springs)

293 **Seminar: Psychology of Thinking** (3) Rice

Review of basic theoretical positions concerning the processes of cognition: memory, concept formation, and reasoning. (Spring 1974 and alternate springs)

295 **Independent Research in Psychology** (arr.) Staff

Individual library or experimental research under supervision of staff member. Arrangements must be made with sponsoring faculty member prior to registration. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy major field examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Public Administration

Professors D.S. Brown (*Chairman*), Waldo Sommers (*Emeritus*), K.E. Stromsem (*Emeritus*)
Professorial Lecturers Ben Posner, C.L. Berg, Martin Kriesberg
Associate Professors S.R. Chitwood, M.M. Harmon
Associate Professorial Lecturer W.E. McConville
Assistant Professors Irwin Dubinsky, B.L. Catron, Elizabeth Cox
Assistant Professorial Lecturer B.T. Pitsvada

Programs of study in Public Administration leading to the degrees of *Master of Public Administration*, *Master of Arts in Government*, and *Doctor of Public Administration* are offered by the School of Government and Business Administration (see pages 130–59).

THIRD GROUP

213 **Administration in Government** (3) Catron, Berg

Critical analysis of federal administrative organizations as an integral part of the political system. Roles of Congress, the President, the courts, interest groups, political parties, and the public in the public decisional process. Special attention to centripetal and centrifugal forces. (Fall and spring)

214 **Policy Analysis in Public Administration** (3) Catron

Introduction to systematic analysis of public policy alternatives. Development of conceptual frameworks for differentiating types of public policies, e.g., distributive, regulatory, redistributive; examination of the contribution of economic, quantitative, and research techniques to the development, administration, and evaluation of these policies. (Fall and spring)

217 **Seminar: Developmental Administration I** (3) Kriesberg

National cultures and their relationships to administrative systems. Colonialism and its vestiges. The problems and deficiencies of administration in underdeveloped countries. (Spring)

218 **Seminar: Developmental Administration II** (3) Brown

Problem of the transfer of administrative capability from one country to another. Political and administrative development. Unilateral and multilateral approaches. The role of the innovator. Strategies of administrative development.

220 **Law, Responsibility, and the Public Administrator** (3) Chitwood

Exploration and analysis of the legal and moral forces and factors which guide the administrator/manager in his decision-making. The role of the law, the courts, and the agency counsel. Understanding the several meanings of responsibility, including accountability. (Fall and spring)

221 **Management in the Executive Branch** (3) Staff

Analysis of application of management theory and practice in the executive branch of the federal government; emphasis on staff responsibilities and relationships and internal organization and control. (Fall)

223 **Behavioral Factors in Large Organizations** (3) Brown

Analysis of the nature and characteristics of bureaucracy; dysfunctionalism; approaches to policy guidance and leadership, particularly in large public organizations; influence and control systems. (Fall and spring)

231 **Public Personnel Administration** (3) Sommers

Survey of basic principles and functions of personnel administration in the public service. Roles of personnel management, recruitment, placement, wage and salary administration, training, retirement, and other personnel functions. (Fall)

232 **Problems in Public Personnel Management** (3) Sommers

Analysis and evaluation of major personnel management problems in government; employee-management relations; interagency and intergovernmental relationships. Impact of automation. Evaluation of personnel systems. (Spring)

233 **Seminar: Manpower Development and Utilization** (3) Dubinsky

Examination of public and private manpower trends, problems, policies, and programs. Exploration of approaches, old and new, to manpower development and utilization. Analysis of impact of economic, political, and social factors on manpower. Students will select a specific area for individual investigation.

234 **Human Behavior and Leadership in Public Administration** (3) Harmon

Analysis of styles of leadership in public organizations. Examination of selected literature in the sociology of knowledge, political science, personality theory, and organization theory as it pertains to the public administrator's perceptions of and behavior in his political and administrative environments. (Fall)

235 **Technological Change and Manpower** (3) Roman

Research, discussion, and readings dealing with manpower problems arising from automation and other technological changes. Evaluation of these developments in government and business; their implications for productivity, employment, training and education, and personnel and industrial relations. Analysis of economic, political, and social factors influencing public and private manpower policies. (Spring)

245 **Managing the Changing Federalism** (3) Cox

An analysis of organic changes in the administration and management of intergovernmental programs in a rapidly changing American federalism. Federal, state, regional, and locally-shared systems studied from theoretical and practical vantages.

246 **Dynamics of Citizen Participation in Administration** (3) Dubinsky

(Formerly Urban Dynamics and Citizen Participation in Administration)

Exploration of the dynamics of citizen participation in administration of metropolitan area programs. Analysis of the nature, costs, and benefits of selected cases of citizen and administrative association. (Fall)

248 **Financing Metropolitan Services** (3) Cox

Analysis of the structure and administration of public finance of local governments.

249 **Administration in Metropolitan Area Governments I** (3) Catron

An ecological approach to understanding and managing urban processes and trends; exploration of economic, social, and political factors that affect metropolitan administration.

250 **Administration in Metropolitan Area Governments II** (3) Cox

Examination of metropolitan governmental structures and functions, public and private demands on the system, decision-making in the urban complex, feedback and evaluation.

*251 **Governmental Budgeting** (3) Page, Posner

Survey of the basic concepts, principles, and practices in governmental budgeting; interrelationship of planning, programming, and budgeting; their role in the management process. (Fall and spring)

* Special sections of this course offered in the Navy Graduate Financial Management Program.

*252 **Problems in Planning, Programming, and Budgeting** (3) Chitwood

Intensive analysis of developments in federal planning, programming, and budgeting; application of new tools in the decision-making process; evaluation of the system. (Fall and spring)

254 **Seminar: Financial Management in the Federal Service** (3) Pitsvada

Functions and interrelationships of central federal financial management agencies, their policy, economic and managerial roles, controllership functions, and standards and practices in financial management. (Spring)

260 **Policy Formulation and Administration** (3) Harmon

Analysis in depth of factors and processes involved in policy development with particular attention to selected areas of national policy; development of agency goals and objectives. (Fall and spring)

262 **Seminar: Science, Technology, and Public Policy** (3) Black

The impact of science and technology upon public administration in terms of both administrative practice and national policies. (Spring)

271 **Readings and Research in Public Administration** (3) Staff

Advanced directed readings and research in specific areas. (Fall and spring)

273 **Colloquium: Public Administration and American Political and Social Institutions** (3) Chitwood

Supervised study in depth of contemporary literature in selected fields, and of research methodology in public administration. Primarily for doctoral candidates. (Fall)

274 **Colloquium: Trends in Public Administration Theory** (3) Harmon

Survey of contemporary normative and epistemological issues in public administration theory and practice. Analysis of the past and present influence of logical positivism, behavioralism, humanism, existentialism, phenomenology, and public interest theory. Required for doctoral candidates; open to advanced Master's degree candidates with permission of instructor. (Spring)

292 **Public Program Evaluation** (3) Dubinsky

Theory and practice of program evaluation and evaluative research. Exploration of scope and limitations of current practice in evaluation due to economic, political, social, and administrative factors. Examination of methodological considerations for data collection, analysis, and dissemination. Students will conduct individual evaluative projects. Prerequisite: P Ad 295 or equivalent, or permission of instructor. (Spring)

295 **Research Methodology** (3) Dubinsky

Survey of research methods; application to problems of public administration. (Fall and spring)

299 **Thesis Seminar** (3) Staff

Examination of thesis standards, research philosophy and methodology in public administration. (Fall and spring)

* Special sections of this course offered in the Navy Graduate Financial Management Program.

300 **Thesis Research** (3) **Staff**
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) **Staff**
Limited to students preparing for the Doctor of Public Administration general examination. May be repeated for credit (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Public Administration candidates. May be repeated for credit. (Fall and spring)

RELATED COURSES IN LAW

With the permission of the Chairman of the Department of Public Administration and the Dean of the National Law Center, students may elect the following courses offered by the National Law Center. For description of the courses, consult the *National Law Center* catalogue.

349 *Local Government Law* (2)
407 *Seminar: Regulation of Transportation I* (2)
408 *Seminar: Regulation of Transportation II* (2)

Public and International Affairs

Professors R.H. Davison, J.W. Kendrick, C.E. Galbreath, R.B. Thompson, J.N. Mosél, F.H. Michael, Joseph Aschheim, H.L. LeBlanc, R.K. White (*Emeritus*), Andrew Gyorgy, Benjamin Nimer, R.P. Sharkey, C.T. Stewart, Jr., J.W. Robb, Helen Yakobson, H.C. Hinton, H.M. Sachar, George Stambuk, Henry Solomon, Vladimir Petrov, B.M. Sapin, Chung-wen Shih, R.K. Lewis, Ching-Yao Hsieh, Gaston Sigur, Marvin Gordon, P.P. Hill, J.A. Morgan, Jr.
Adjunct Professor T.F. Carroll
Professorial Lecturers Joseph Baclawski, John Hardt, Tao-tai Hsia, Bernard Ramundo, Lothar Metzl, T.W. Wolfe, Eleanor Hadley
Associate Professors W.R. Johnson, C.A. Moser, R.Y.C. Yin, J.K. McDonald, C.F. Elliott, R.M. Dunn, Jr., Bernard Reich, Young Kim, Richard Thornton, C.A. Linden, Peter Poole, G.C. Eads, S.J. Wayne, J.M. Logsdon
Adjunct Associate Professors Donald Robinson, R.A. Young
Associate Professorial Lecturers Philip True, Horia Socianu
Assistant Professors G.C.Y. Wang, D.L. Lee, J.E. Fredland, R.E. Darcy, J.M. Starrels, S.W. Burks, S.A. Grant, P.F. Klarén, A.M. Yezer, H.R. Nau, R.L. Cole, Dana Fischer, K.J. Langran, L.P. Ribuffo
Adjunct Assistant Professor K.L. Storrs
Assistant Professorial Lecturer L.L. Perez
Instructor Rachel Keith

Programs of study in Chinese Languages and Literature, Chinese Studies, International Affairs, Public Affairs, and Urban Affairs leading to the degree of *Bachelor of Arts* and programs of study in International Affairs, Latin American Studies,

Public Affairs, Russian Studies, and Science, Technology, and Public Policy leading to the degree of *Master of Arts* are offered by the School of Public and International Affairs (see pages 160–76).

Religion

Professors R.G. Jones (*Chairman*), H.E. Yeide, Jr., Dewey Wallace, Jr.
Associate Professor A.J. Hiltebeitel
Assistant Professor Sonya Quitslund
Assistant Professorial Lecturer M.S. Halpern

Bachelor of Arts with a major in Religion (Field-of-Study).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Rel 9, 10, and 59-60.

The coordinated field of knowledge upon which the student will be examined for his major examination at the end of the senior year includes the history and literature of the world's religions and the philosophical and ethical problems of religious thought. A student may elect to give special emphasis in his program to Christianity, Judaism, or the religions of India. A proseminar (Rel 199–200) assists the student in preparing for the major examination. A pamphlet containing a detailed description of the major is available in the offices of the Dean of Columbian College of Arts and Sciences and the Chairman of the Department of Religion.

Master of Arts in the field of Religion.—Prerequisite: the degree of Bachelor of Arts with a major in Religion from this University, or an equivalent degree.

Required: the general requirements, pages 90–97. Of the 24 semester hours of required courses (exclusive of the thesis), at least 12 must be in third-group Religion courses; a maximum of 9 may be in a closely related field outside the Department of Religion as approved by the Department. The Master's Comprehensive Examination must cover three fields (the thesis research must be on one of these three fields) selected from the following: the Old Testament, the New Testament, History of Christianity, History of Religion in America, Modern Religious Thought, Ethics, Sociology of Religion, and History of Religions. A reading knowledge examination, usually in French or German, is required; however, Hebrew or Greek is acceptable for those students whose thesis area is in the Biblical field and Sanskrit or an Eastern language for those whose thesis area is in the History of Religions.

Master of Arts in the field of Religious Education.—Prerequisite: the degree of Bachelor of Arts with a major in Religion from this University, or an equivalent degree. The undergraduate program should have included the following courses or equivalent: Anth 1; Educ 108; Psyc 1, 22, and 29; Sp&D 1 or 11.

Required: the general requirements, pages 90–97. Of the 24 semester hours of required courses (exclusive of the thesis), at least 6 must be in third-group Religion courses; a maximum of 12 may be in a closely related field outside the Department of Religion as approved by the Department.

Master of Arts in the field of Religion and Medical Care.*—Prerequisite: (1) the degree of Bachelor of Arts with a major in Religion from this University, or an equivalent degree; (2) a first professional theological degree; or (3) acceptable academic work required of entering medical students who have not earned a Bachelor's degree, but who are pursuing the degree of Doctor of Medicine.

* Certain courses in this program are offered only through Off-campus Centers of the College of General Studies.

Required: the general requirements, pages 90–97. The program of study consists of 36 semester hours of approved course work with or without a thesis. Students must elect course work covering four fields selected from Clinical Pastoral Care, Religion, Sociology, Psychology, Health Care Administration, and Medicine. The course work in these fields must be distributed as follows: 12 semester hours each selected from two fields and at least 6 hours in Clinical Pastoral Care. The Master's Comprehensive Examination must cover three fields selected from the list above, one of which, as approved by the Department, must be outside of the Department of Religion. Supervised clinical education may be offered as a tool subject in lieu of the required reading knowledge examination in a foreign language.

Doctor of Philosophy in the field of American Religious History (offered in cooperation with the Department of History).—Required: the general requirements, pages 90–94, 97–99. The General Examination must cover four fields, including two from the Department of Religion (History of Religion in America and either Early Christianity or European Christianity since 1500) and two from the Department of History (generally American Social History and one other).

FIRST GROUP

9 **The Hebrew Scriptures** (3) Jones, Quitslund
(Formerly The Old Testament)
Historical and literary study of the Hebrew Scriptures with consideration of development of religious ideas, institutions, and outstanding personalities. (Fall)

10 **The New Testament** (3) Jones, Quitslund
Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles. (Spring)

21 **Introduction to Religious Thought** (3) Yeide
Traditional religious concepts, language of contemporary religion amidst modern scientific and secular intellectual tendencies, and the place of religion in today's society. (Fall)

22 **Introduction to Social Ethics** (3) Yeide
Illumination of social problems by ethical reflection; examination of ethical perspectives as stimuli and barriers to social change; techniques for maintaining social values and seeking change. (Spring)

59–60 **History of Religions** (3–3) Wallace, Hiltebeitel
Origins, evolution, and contemporary status in historical context. Rel 59: primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam). (Rel 59 and 60—fall and spring)

SECOND GROUP

103 **The Prophets** (3) Quitslund
Development of prophetism in the Old Testament; cultural, economic, psychological, and religious factors; elements of lasting value in the prophetic teaching. Study of selected prophets. (Fall)

104 **The Life and Thought of Jesus** (3) Quitslund

Comprehensive study of the life and teachings of Jesus with critical attention to sources.

105 **The Life and Thought of Paul** (3) Quitslund

Backgrounds of early Christianity, first-century religious and social conditions affecting the spread of Christianity, the life and journeys of Paul, Paul's presentation of the Christian faith.

111 **Myth, Epic, and Novel** (3) Hiltebeitel

Exploration of the religious themes and cultural significance of literature: e.g., Indian and Babylonian epic; the Bible; Greek epic and drama; Dante and Milton; Dostoevsky, Kafka, Hesse, Faulkner, Beckett, and Clark. (Spring)

122 **Christian Ethics and Modern Society** (3) Yeide

Nature and principles of Christian life as developed by the Christian community; problems of personal conduct; application to family, social, and economic institutions.

124 **Contemporary Movements in Theology** (3) Quitslund

Theological approach and systems of a selected number of modern theologians. (Fall)

126 **Western Mysticism** (3) Quitslund

Study of the phenomenon of religious experience and of selected mystics in Judaism, Christianity, and Islam. (Spring)

127 **Medicine, Religion, and Healing** (1) Staff

Total care concept. Importance of religion in medical practice for patient and physician. Concept of the professional man, the clergy's role in healing, religious perspective on issues in medical ethics. (Spring)

135 **History of Judaism to the Talmud** (3) Staff

History and religious thought of the Jewish people from the Maccabean revolt to the compilation of the Talmud. (Fall)

136 **History of Medieval and Modern Judaism** (3) Staff

History and religious thought of the Jewish people from the compilation of the Talmud to the present. (Spring)

137 **The Land of Israel and the Growth of the Western Religions** (6) Jones, Halpern

138 **Major Trends in Modern Judaism** (3) Staff

Religious developments in Judaism as reflected in major writers and movements since Mendelssohn. Writings illustrative of Orthodox, Conservative, Reform, and Reconstructionist thought. (Spring)

139 **Meaning of the Talmud in Jewish Life** (3) Staff

Historical setting for the compilation of the Talmud; analysis of content and methodology; detailed study and exegesis of some major portions in English translation. (Fall)

141–42 **Religious Education** (3–3)

Religious education in the home, church, and community; basic educational procedures and special techniques; organization and administration.

143 **Early Christianity and the Spiritual Life of the Ancient World** (3) Wallace

Rise and development of Christianity in relation to the culture, philosophy, mystery religions, and general religious life of the Graeco-Roman world to A.D. 500.

144 **Medieval Faith and Symbolism** (3) Wallace

Christian life and thought in the Middle Ages: mystics, saints, popes, and philosophers.

145 **Religious Currents in the Renaissance and Reformation** (3) Wallace

Transformation of Western man's understanding of his identity and destiny from the end of the Middle Ages to the Age of Reason. (Fall)

146 **Christianity in the Modern World** (3) Wallace

Changing religious styles and patterns since the Age of Reason as seen in theology, literature, political life, and religious institutions. (Spring)

157 **Indian Philosophy and Mysticism** (3) Hiltebeitel

Indian speculative and mystical traditions; late Vedas, Upanishads, Bhagavad Gita, Buddhist, and Hindu soteriological systems.

159 **Mythologies of India** (3) Hiltebeitel

(Formerly Hinduism)

Myths, rituals, symbols of Vedic, Puranic, and Tantric Hinduism, and of Jainism and Buddhism; Hindu epics. (Fall)

160 **Buddhism** (3) Hiltebeitel

Origin, development, and contemporary status of Buddhist life and thought; its impact on Asian civilization. (Spring)

161 **Islam** (3)

Origin, development, and contemporary status of Islamic life and thought; its impact on the Near East.

162 **Symbolism in the History of Religions** (3) Hiltebeitel

Religious symbolism, myth, legend, and ritual in the religions of the world; various theoretical analyses. (Fall)

172 **Religion in American Culture** (3) Wallace

Growth of religious bodies and institutions in relation to American culture, development of religious thought, and analysis of the contemporary religious scene. (Spring)

199–200 **Proseminar: Readings for the Major** (3–3) Staff

Readings and group discussions. (Academic year)

THIRD GROUP

209–10 **Seminar: Biblical Studies** (3–3) Jones

Main problems of Biblical literary, historical, and theological criticism. (Academic year)

213 **Seminar: Inter-testamental Judaism** (3) Jones

Historical and religious development of Judaism as seen in the Apocrypha, Pseudepigrapha, Dead Sea Scrolls, Philo, and early Rabbinism.

*216 **Supervised Clinical Pastoral Education (I–A)** (6) Staff

Full-time program of clinical pastoral education in an approved center. Involvement in the responsibility for pastoral ministry is reviewed and evaluated in a peer-group context.

*217 **Supervised Clinical Pastoral Education (I–B)** (6) Staff

Continuation of Rel 216 with emphasis on pastoral and personal identity, sustained pastoral relationships, and pastoral methods and skills.

*218 **Supervised Clinical Pastoral Education (III–A)** (6) Staff

Responsibility in pastoral ministry is increased with emphasis on group work, interprofessional involvement, use of specific counseling methods, work with persons with special problems. Prerequisite: Rel 216 and 217; or equivalent.

*219 **Supervised Clinical Pastoral Education (III–B)** (6) Staff

Continuation of Rel 218 with emphasis on examination and review of administrative procedures, design of pastoral programs, and development of pastoral theology.

222 **Seminar: Christian Ethics** (3) Yeide

Important tendencies in ethical reflection of the contemporary Christian Church; contributions of social sciences to that reflection.

*223 **Religious and Ethical Perspectives on Medical Problems** (3)

Religious and ethical questions in medical problems and medically related issues.

*225 **The Dynamics of Ministering to the Young Adult** (3)

Conceptual models of development of young adults from late adolescence; special problems of educational and military experience, vocational choice, marriage and the family, and physical, intellectual, emotional, and religious development. Encounter experience with persons and groups.

*227–28 **Advanced Studies in Pastoral Care** (3–3)

History and present state of methodologies and conceptual models of pastoral counseling and leadership in groups; supervised work in interfaith and multidisciplinary ministries.

235 **Seminar: Roman Catholicism in the Modern World** (3) Quitslund

Important leaders and their ideas in selected development since 1500—doctrinal, spiritual, biblical, liturgical, and ecumenical. (Spring)

237 **Seminar: Theological Analysis** (3) Quitslund

Historical and topical study of the development of important ideas in such areas as Christology, soteriology, and ecclesiology.

238 **Seminar: Contemporary Jewish Religious Thought** (3) Staff

Selected topics. (Spring)

* Offered through the College of General Studies at Off-campus Centers for students in the Master's degree program in the field of Religion and Medical Care.

241–42 **Seminar: Religious Education** (3)
Major problems in the practice of religious education.

262 **Seminar: History of Eastern Religions** (3) Hiltebeitel
Selected topics.

271 **Seminar: American Religious History to 1830** (3) Wallace
Religious thought and life during the Colonial and early National period.

273 **Seminar: American Religious History since 1830** (3) Wallace
Religious thought and life from the Civil War to the present. (Fall)

291–92 **Readings and Research** (3–3) Staff
Investigation of special problems. (Academic year)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Romance Languages and Literatures

Professors J.W. Robb, G.E. Mazzeo, J.A. Frey, J.L. Métivier, Jr., J.F. Burks (*Chairman*)
Associate Professors Mary Ann Coffland, Pilar Sáenz
Assistant Professors Elizabeth Neyman, G.P. Huvé, Julia Hicks, Maria Wilmeth, Shirley Barnett, Ines Azar, J.M. Thibault, Gregory Ludlow

Bachelor of Arts with a major in (1) *French Language and Literature*, (2) *Spanish American Literature*, (3) *Spanish Language and Literature*, or (4) *any approved combination selected from two of the preceding* (*1*), (*2*), (*3*), *fields* (*Field-of-Study* or *Departmental*).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Fren 1–2, 3–4, 9–10, or equivalent; or Span 1–2, 3–4, 9–10, or equivalent.
3. Required introductory literature courses—Fren 51–52 or 91–92, or Span 51–52 or 91–92.
4. Required for the major:

Field-of-Study major—there is no specific program of courses; however, the passing of the major examination is assumed to be a convincing demonstration that the student possesses the breadth, depth, and knowledge of his major in terms of semester hours, courses, and grades. A proseminar in each of the major fields assists the student in his preparation for the major examination.

Departmental major—(a) 6 to 12 semester hours selected from Fren 103, 108, 109–10, and 193; no more than 36 semester hours of second-group French literature courses; or (b) 6 to 12 semester hours selected from Span 109–10, 193, and one other approved Spanish language course; no more than 36 semester hours of second-group Spanish or Spanish American literature courses.

It is strongly recommended that students elect two courses in one other literature outside of their major field.

Master of Arts in the fields of (1) *French Literature,* (2) *Spanish American Literature,* and (3) *Spanish Literature.*—Prerequisite: the degree of Bachelor of Arts in the appropriate field from this University, or an equivalent degree.

Required: the general requirements, pages 90–97. The program of study consists of 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours), or with the approval of the Department a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis.

Doctor of Philosophy fields of study in Romance Literatures.—Required: the general requirements, pages 90–94, 97–99. There are four fields: French Literature; Spanish Literature; Spanish American Literature; and any approved combination of French, Spanish, or Spanish American Literature.

Bachelor of Arts in Education with teaching fields in French and in Spanish.—Prerequisite: the Education curriculum, pages 76–77.

Required: the French option or the Spanish option and the professional courses listed on pages 110–11, 115, 117.

Placement Examinations: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

FRENCH

Departmental prerequisite: Fren 3–4 or 6, or equivalent, is prerequisite to all second-group courses in French.

FIRST GROUP

1–2 First-year French (3–3) Burks and Staff

A year course: credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern French prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Fren 1 and 2—fall and spring)

3–4 Second-year French (3–3) Thibault and Staff

A year course: credit toward a degree at this University given on completion of Fren 4. Conversation, grammar, composition, reading in modern French prose, introduction to French civilization. Aural training, oral practice in language laboratory. Prerequisite: Fren 1–2 or two years of high school French. Laboratory fee, $17.50 a semester. (Fren 3 and 4—fall and spring)

6 Second year French (6) Thibault and Staff

Lecture (3 hours), discussion (3 hours). Intensive course which covers material of Fren 3–4. Grammar review, reading, conversation. Prerequisite: two years of high school French with grades of *B* or better; Fren 2. (Spring)

9 Expression orale du français contemporain (3) Huvé and Staff

(Formerly French Conversation and Composition)

Emphasis on conversion in a controlled situation. Special attention to the acquisition and active use of a flexible vocabulary. Oral reports. Prerequisite: Fren 3–4 or equivalent. (Fall and spring)

10 **Cours de Syntaxe** (3) — Huvé and Staff
(Formerly French Conversation and Composition)
Grammar, writing of exercises, compositions, and translation. Analysis of vocabulary and syntax and their effects in samples of writing. Prerequisite: Fren 3–4 or equivalent. (Fall and spring)

12 **French Conversation and Composition (Intensive)** (6) — Huvé and Staff
Intensive course which covers material of Fren 9 and 10. Laboratory fee, $25.

49 **French for Graduate Students** (0) — Staff
For graduate students preparing for reading examinations. No academic credit. Tuition fee, $270. (Fall and spring)

51–52 **Survey of French Literature** (3–3) — Métivier and Staff
Readings in French literature from the Middle Ages to the present. Lectures, readings, recitations, and informal discussions. (Fren 51 and 52—fall and spring)

91–92 **Analyse de texte** (3–3) — Thibault
Methodology and vocabulary of literary criticism; application of principles of *explication de texte* to selections from prose, drama, and poetry from the Renaissance to the present. (Academic year)

SECOND GROUP

103 **Diction, Phonétique appliquée** (3) — Huvé
(Formerly Pronunciation and Intonation)
The sound of French; elements of articulatory phonetics. Exercises in reading and speech with attention to pronunciation, accent, rhythm, and intonation. (Fall)

108 **Cours de grammaire avancée** (3) — Thibault
(Spring)

109 **La Langue pratique** (3) — Huvé and Staff
(Formerly Advanced French Conversation and Composition)
Advanced level study. Practical and everyday vocabularies developed through systematic drills of syntactical patterns. (Fall and spring)

110 **Cours de stylistique** (3) — Huvé and Staff
(Formerly Advanced French Conservation and Composition)
Ce cours permet d'étudier les mots (signification, propriétés, fonctions grammaticales, valeur psychologique, effets sonores, déplacement possible), et la phrase (les propositions, les rapports qui s'établissent entre elles, les modifications qu'elles peuvent subir), ainsi que certains procédés stylistiques relevant de la rhétorique. (Fall and spring)

119–20 **French Literature of the Middle Ages and the Renaissance** (3–3) — Métivier
Literary history and the development of ideas. *Les chansons de geste*, courtly literature, satire, the theatre, lyric and didactic poetry; Rabelais, Montaigne, La Pléiade. Class analysis of texts, collateral readings.

121–22 **17th Century French Literature** (3–3) Burks

History, philosophy, criticism, letters, eloquence, drama, fiction, poetry. Class analysis of texts; collateral readings. (Academic year)

123–24 **18th Century French Literature** (3–3) Ludlow

History, philosophy, criticism, letters, drama, fiction, poetry, the "salons," idea of progress, idea of science. Class analysis of texts, collateral reading.

125–26 **19th Century French Literature** (3–3) Frey, Thibault

Poetry, drama, and novel of the 19th century with emphasis on stylistic analysis. Offered in English translation, 1974-75 and alternate years; offered in French, 1975-76 and alternate years. (Academic year)

127–28 **20th Century French Literature** (3–3) Coffland, Thibault

Fiction, poetry, and drama from 1900 to present. Chronological examination of authors, movements. Offered in French, 1974-75 and alternate years; offered in English translation, 1975-76 and alternate years. (Academic year)

129–30 **Contemporary French Literature** (3–3) Ludlow, Burks

151 **Cinema and Literature—in English** (3)

May be repeated for credit.

193 **Cours de style** (3) Staff

Advanced grammar, composition, and stylistics. Open to both advanced undergraduate and graduate students. Recommended for majors and teachers of French.

199–200 **Proseminar: Readings for the Major** (3–3) Staff

Conferences and group discussions. (Academic year)

THIRD GROUP

202 **Thème et Version** (3) Staff

Limited to students in the Graduate School of Arts and Sciences; open to others only by permission of the graduate adviser. Required of all graduate students in the field of French Language and Literature. Analysis and translation of selected prose passages, alternating between French and English; designed to teach students to write with precision and clarity. (Fall)

212 **Historical French Grammar** (3) Staff

Phonology, morphology, and syntax of Old French; its development from Vulgar Latin. Prerequisite: a second-group course in French literature. Knowledge of Latin useful.

213–14 **Medieval French Literature** (3–3) Staff

French literature to the end of the Middle Ages. Prerequisite: a second-group course in French literature.

221 **Special Problems in 16th Century French Literature** (3) Burks

May be repeated for credit. (Topic for fall 1974: prose of the Age of Rabelais)

226 **16th and 17th Century Philosophical Literature** (3) Burks

The emergence of a literature of ideas; emphasis on the thought of Calvin, Montaigne, Descartes, and Pascal.

229–30 **Literary Renaissance in Europe** (3–3) Burks

Study of the developments in the poetry of Italy, France, and England.

231–32 **Theatre in the 17th Century** (3–3) Staff

Survey of the development of theatrical arts and the drama. Research papers and reports.

234 **17th Century Nondramatic Literature** (3) Staff

Rationalism and the revolt against authority expressed in literature. Impact of nondramatic literature on the development of classical doctrine. (Spring)

241 **The Rationalistic Current in the 18th Century** (3) Ludlow

The contribution of the *philosophes* to the intellectual evolution of France and Europe. (Spring)

242 **Seminar: the French Novel in the 18th Century** (3) Ludlow

244 **Special Problems in 18th Century French Literature** (3) Ludlow

May be repeated for credit.

253 **Special Problems in 19th Century French Literature** (3) Frey

May be repeated for credit. (Topic for fall 1974: romantic prose)

256 **19th Century French Literature** (3) Frey

258 **Special Problems in 19th Century French Poetry** (3) Frey

May be repeated for credit. (Topic for spring 1975: romantic poetry)

264 **Seminar: Modern Period** (3) Coffland

(Topic for fall 1974: the novel; topic for spring 1975: Proust)

265 **20th Century French Theatre** (3) Coffland

266 **20th Century French Poetry** (3) Coffland

Background and development of poetry in the 20th century; *explication de texte* approach.

295 **Independent Reading and Research in French Literature** (arr.)

For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

George Washington University is a member of the Folger Institute of Renaissance and 18th-century Studies. The policies of the Institute are set by a central committee on which each member institution is represented. Doctoral students enrolled in one of the Institute seminars are eligible to apply for fellowship aid, under a grant from the National Endowment for the Humanities. Folger Institute Seminars

are numbered 301 through 309. Seminar titles for the 1974 fall semester (301, 305, 307, 309) are listed below. Seminar titles for the spring semester (302, 304, 306, 308) will be announced. Students wishing to register for these courses should consult the Chairman of the Department of Romance Languages and Literatures.

301 Anglo-Dutch Relations (3)
(Fall)

305 "King Lear" (3)
(Fall)

307 The Bible (3)
(Fall)

309 Paleography Workshop (3)
(Fall)

398 Advanced Reading and Research (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ITALIAN

FIRST GROUP

1–2 First-year Italian (3–3) Wilmeth and Staff
A year course: credit toward a degree at this University given on completion of Ital 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Italian prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Academic year)

3–4 Second-year Italian (3–3) Wilmeth and Staff
A year course: credit toward a degree at this University given on completion of Ital 4. Conversation, grammar, composition, reading of modern Italian prose, introduction to Italian civilization. Aural training, oral practice in language laboratory. Prerequisite: Ital 1–2 or two years of high school Italian. Laboratory fee, $17.50 a semester. (Academic year)

9–10 Italian Conversation and Composition (3–3) Wilmeth
Prerequisite: Ital 4 or equivalent and permission of instructor. (Academic year)

51–52 Introduction to Italian Literature (3–3) Wilmeth
Prerequisite: Ital 4 or equivalent. (Academic year)

THIRD GROUP

295 **Independent Reading and Research in Italian Literature** (arr.)
For students preparing for the Master of Arts or Doctor of Philosophy degree. May be repeated for credit. (Fall and spring)

PORTUGUESE

FIRST GROUP

31–32 **Intensive Portuguese** (3–3) Robb
Prerequisite: knowledge of one other Romance language. (Academic year)

SPANISH

Departmental prerequisite: Span 3–4 or 6, or equivalent, is prerequisite to all second-group courses in Spanish.

FIRST GROUP

1–2 **First-year Spanish** (3–3) Azar and Staff
A year course: credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester. (Span 1 and 2—fall and spring)

3–4 **Second-year Spanish** (3–3) Barnett and Staff
A year course: credit toward a degree at this University given on completion of Span 4. Conversation, grammar, composition, reading of modern Spanish prose, introduction to Hispanic civilization. Aural training, oral practice in language laboratory. Prerequisite: Span 1–2 or two years of high school Spanish. Laboratory fee, $17.50 a semester. (Span 3 and 4—fall and spring)

6 **Second-year Spanish** (6) Neyman
Lecture (3 hours), discussion (3 hours). Intensive, accelerated course which covers material of Span 3–4. Grammar review, reading, conversation. Prerequisite: two years of high school Spanish with grades of *B* or better, or grades of *A* or *B* in Span 2. (Spring)

9–10 **Spanish Conversation and Composition** (3–3) Hicks and Staff
Prerequisite: Span 4 or equivalent and permission of instructor. Students who receive credit for Span 9 cannot receive credit for Span 19. (Span 9 and 10—fall and spring)

12 **Spanish Conversation and Composition (Intensive)** (6) Staff
Intensive, accelerated course which covers the material of Span 9–10. Laboratory fee, $25.

19 **Community Spanish** (3) Staff
Spanish conversation; emphasis on developing linguistic skills necessary for working with the Spanish-speaking community. Class work supple-

mented by work-study program with social agencies within the Spanish-speaking community. Admission by permission of instructor. Students who receive credit for Span 19 cannot receive credit for Span 9.

49 **Spanish for Graduate Students** (0) Hicks

For graduate students preparing for reading examinations. No academic credit. Tuition fee, $270. (Fall and spring)

51–52 **Survey of Spanish Literature and Civilization** (3–3) Barnett

Social, artistic, and cultural background of Spanish literature. Lectures, readings, recitations, and informal discussions. (Academic year)

91–92 **Explicación de textos** (3–3) Sáenz

Analytical introduction to Spanish and Spanish American literature. Method demonstrated and practiced on selected passages. (Academic year)

SECOND GROUP

109–10 **Advanced Spanish Conversation and Composition** (3–3) Mazzeo

Emphasis on diction and style. Prerequisite: Span 10 or equivalent and permission of instructor. (Academic year)

119–20 **Medieval Spanish Literature** (3–3) Azar

Survey by genre of the literature of the Middle Ages. (Academic year)

121–22 **Spanish Literature of the Golden Age** (3–3) Azar

Span 121: Renaissance and Baroque Spanish poetry, the Spanish *comedia*. Span 122: narrative prose of the Golden Age.

123–24 **Cervantes: Don Quijote** (3–3) Azar

The *Quijote* and the novel as a literary genre: reality and fiction. (Academic year)

125–26 **Modern Spanish Literature** (3–3) Mazzeo

Prose, poetry, and drama of the 18th and 19th centuries. Class analysis of texts, collateral reading, lectures on literature and history. (Academic year)

127–28 **Contemporary Spanish Literature** (3–3) Sáenz

Prose and poetry of the 20th century. Class analysis of texts, collateral reading, lectures on literature and history.

129 **The Romantic Drama in Spain** (3) Mazzeo

Lectures on the Spanish Romantic Drama, class analysis of representative plays, collateral readings.

130 **The Modern Spanish Essay** (3) Mazzeo

Development of the Spanish essay from the 16th century; emphasis on the 18th and 19th centuries. Class analysis of texts, collateral reading, and lectures.

131 **The Generation of 1898** (3) Staff

Study of the various critical problems related to this renaissance of Spanish letters as a whole, and of its most representative figures and works

135 **The Spanish Theatre of the Realist Period** (3) Barnett

Study and analysis of the works of Ventura de la Vega, López de Ayala, Tamayo y Baus, Echegaray, and Pérez Galdós.

141 **Introduction to Spanish American Literature** (6) Robb

Highlights of Spanish American literature through the colonial and modern periods. Of special interest to majors in Latin American Studies.

151–52 **The Spanish American Novel** (3–3) Robb

Development of the novel in Spanish America. Lectures, collateral reading, and class analysis of texts. (Academic year)

155–56 **Spanish American Literature to 1880** (3–3) Robb

Literature of Spanish America from the colonial period to the latter part of the 19th century. Lectures, collateral reading, reports, and class analysis of important works.

157–58 **Spanish American Literature since 1880** (3–3) Robb

Literature of Spanish America from 1880 to the contemporary period. Lectures, collateral reading, reports, and class analysis of important works.

193 **Curso de estilo** (3) Staff

Advanced grammar, composition, and stylistics. Open to both advanced undergraduate and graduate students. Recommended for majors and teachers of Spanish.

197–98 **Proseminar: Readings for the Major in Spanish American Literature** (3–3) Robb

Recommended for all majors. Conferences and group discussions. (Academic year)

199–200 **Proseminar: Readings for the Major in Spanish Language and Literature** (3–3) Staff

Recommended for all majors. Conferences and group discussions. (Academic year)

THIRD GROUP

215 **Old Spanish Language and Literature** (3) Staff

221 **Seminar: Cervantes' "Don Quijote"** (3) Azar

Cervantes' literary theories, the *Quijote* and its relations with the other *novelas cervantinas* as different modes of representing reality in literary fiction. (Fall)

224 **Seminar: Special Problems in Spanish Renaissance Literature** (3) Azar

(Topic for spring 1975: *La Celestina*)

225 **Seminar: Special Problems in Golden Age Literature** (3) Azar

231 **Seminar: 18th Century Spanish Writers** (3) Mazzeo

Lectures and analysis of principal authors and works; relationships with subsequent literary movements.

242 **Seminar: Spanish Romanticism** (3) Mazzeo

Lectures and analysis of principal authors and works. Collateral readings. Problems of origins and developments.

244 **Seminar: Naturalism and the Spanish Novel** (3) Mazzeo

Development of Naturalism in 19th century Spain. Analysis of representative works of Pardo Bazán, Clarín, Blasco-Ibáñez, and others. (Fall)

246 **Seminar: Works of Galdós** (3) Barnett

Ideological and stylistic analysis: relationship of Galdós' works to literary movements of the second half of the 19th century. (Spring)

248 **Seminar: Spanish Lyric Poetry of the 20th Century** (3) Sáenz

Stylistic analysis of the most significant poets from 1898 to the present. (Spring)

250 **Novecentismo y Literatura de Entreguerras** (3) Sáenz

The prose writers: intellectualism and new forms of expression. (Spring)

251 **Seminar: Works of Unamuno and Ortega y Gasset** (3) Sáenz

Study of the thought of Unamuno and Ortega y Gasset; analysis and commentary on the texts.

252 **Spanish Literature since the Civil War** (3) Sáenz

Development of the Spanish novel in the last thirty years.

253 **Seminar: Studies in Modern Spanish American Poetry** (3) Robb

255 **Seminar: Studies in 20th Century Spanish American Theatre** (3) Robb

(Fall)

256 **Seminar: Studies in Mexican Narrative Prose** (3) Robb

261 **Seminar: Studies in Spanish American Essayists** (3) Robb

The Spanish American essay as an artistic form; selected modern essayists.

264 **Seminar: Studies in Recent Spanish American Fiction** (3) Robb

(Spring)

266 **Seminar: Alfonso Reyes** (3) Robb

Alfonso Reyes, the essayist-artist, poet, and complete humanist, as studied in his various prose and poetic works.

287 **Seminar: Problems in Latin American Civilization** (3) Staff

Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

295 **Independent Reading and Research in Spanish and Spanish American Literature** (arr.)

For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Sanskrit

See "Germanic Languages and Literatures."

Service-Learning Program*

Professor C.C. Mondale
Instructor Rachel Keith

SERVICE-LEARNING EXPERIMENTAL HUMANITIES

SECOND GROUP

150 **Learning through Service** (3 to 15) Mondale and Staff
Open only to juniors and seniors. Students undertake an assignment with an off-campus agency or group. Arrangements are made through a "contractual" agreement among the student, the agency or group, and the Service-Learning Program, with the amount of credit depending upon the nature of the assignment. (Fall and spring)

SERVICE-LEARNING POLITICAL SCIENCE

SECOND GROUP

154 **Law and Social Change** (6) Staff
Study of the legal system and its role in promoting social change. Readings, group discussions, and work with lawyers and 3rd-year law students. (Fall and spring)

155 **American Political Behavior** (6) Keith
Internship in a variety of lobbying groups. Analysis of the structural and behavioral limitations which confront those who wish to exercise political influence. (Fall and spring)

* Administered by the Division of Experimental Programs.

Sino-Soviet Studies

See "Institute for Sino-Soviet Studies."

Slavic Languages and Literatures

Professor Helen Yakobson
Associate Professors Nadine Natov, C.A. Moser, G.A. Olkhovsky (*Chairman*), W.W. Rowe, Irene Thompson
Associate Professorial Lecturer Juri Jelagin
Assistant Professor M.A. Kandel
Adjunct Assistant Professor Mary Miller

Bachelor of arts with a major in Russian Language and Literature (Field-of-Study or Departmental).—The following requirements must be fulfilled.

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Slav 5–6 (preferred), or Slav 1–2, 3–4; or equivalent; and Slav 91–92.
3. Required for the major.

Field-of-Study major—By the end of the senior year the student will be expected to have a reasonable command of language skills and a grasp of the fundamentals of Russian structure, as well as a good foundation in Russian literature and culture. The passing of a major examination during the senior year is required. The Department provides a proseminar to assist the student in his preparation for the major examination.

Departmental major—from 30 to 36 semester hours of course work in the Department of Slavic Languages and Literatures distributed as follows: Language—9 to 12 hours chosen from Slav 7–8, 9–10, 101, 109–10, 197, 198; Linguistics—3 hours chosen from Slav 125 or 126; Culture and Civilization—6 hours chosen from Slav 161–62, 171; Literature in Russian—6 hours chosen from Slav 141–42, 146, 152; Literature in English Translation—6 to 9 hours chosen from second-group courses.

A student who is already proficient in Russian language or literature may, upon passing an appropriate examination, waive any or all of the first-group language or literature courses, as well as up to 6 semester hours of second-group courses.

Bachelor of Arts with a major in Russian Literature and Culture—in Translation (Field-of-Study).—The following requirements must be fulfilled.

1. The general requirements as stated on pages 73, 80–86.
2. Prerequisite courses—Slav 47 and 49, or Slav 1–2 and 3–4, or equivalent; and Slav 91–92.
3. By the end of the senior year the student will be expected to have a good grasp of Russian literature and the principles of literary criticism, as well as a general knowledge of Russian culture and history. The passing of a major examination during the senior year is required. The Department provides a proseminar to assist the student in his preparation for the major examination.

A student who is already proficient in Russian language or literature may, upon passing an appropriate examination, waive any or all of the first-group language or literature courses, as well as up to 6 semester hours of second-group courses.

Master of Arts in the field of Russian Language and Literature.—Two areas of concentration are offered: Russian literature or Russian language.

Prerequisite: the degree of Bachelor of Arts with a major in Russian Language and Literature or Russian Literature and Culture—in Translation from this Univer-

ity, or an equivalent degree. A student planning a concentration in Russian literature must have a good reading knowledge of the Russian language, a firm grasp of 19th and 20th century Russian literature, and an acquaintance with Russian history and culture. A student planning a concentration in Russian language must have a general knowledge of the structure of the Russian language, proficiency in oral and written expression, and an acquaintance with 19th and 20th century Russian literature.

Required: the general requirements, pages 90–97. The program of study consists of 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours) or 36 semester hours of approved course work without a thesis (the Department may waive up to 6 semester hours in the 36-semester-hour program). Candidates electing the Russian literature concentration must include 6 semester hours of linguistics and at least 18 hours of literature; candidates electing the Russian language concentration must include 6 semester hours of literature and at least 18 hours of language and linguistics. All candidates must pass a reading knowledge examination in either French or German and must pass a Master's Comprehensive Examination in their area of concentration.

Bachelor of Arts in Education with a teaching field in Russian.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Russian option and the professional courses listed on pages 114–15, 117.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

FIRST GROUP

1–2 **First-year Russian** (3–3) Yakobson and Staff

Beginners' course in fundamentals of grammar and pronunciation. Slav 1 is prerequisite to Slav 2. Laboratory fee, $17.50 a semester. (Slav 1 and 2—fall and spring)

3–4 **Second-year Russian** (3–3) Yakobson and Staff

Intermediate course in Russian language. Prerequisite to Slav 3: Slav 1–2 or two years of high school Russian. Prerequisite to Slav 4: Slav 3. Laboratory fee, $17.50 a semester. (Academic year)

5–6 **Intensive Beginning Russian** (6–6) Thompson

Classroom (10 hours), laboratory (1 hour). Beginners' intensive course in the fundamentals of Russian. Prerequisite to Slav 6: Slav 2 or 5. Laboratory fee, $17.50 a semester. (Academic year)

7–8 **Intensive Advanced Russian** (6–6) Miller

Emphasis on vocabulary expansion, systematic review of Russian grammar. Prerequisite to Slav 7: Slav 4 or 6, or equivalent. Prerequisite to Slav 8: Slav 7 or equivalent. (Academic year)

9–10 **Intermediate Russian Conversation and Composition** (3–3) Staff

Listening comprehension; oral and written practice. Prerequisite: Slav 4 or 6, or permission of instructor. (Academic year)

31–32 **Elementary Polish** (3–3) Staff

Beginners' course in the fundamentals of grammar and pronunciation. Slav 31 is prerequisite to Slav 32. Laboratory fee, $17.50 a semester.

41–42 **Elementary Serbo-Croatian** (3–3) Staff
Beginners' course in the fundamentals of grammar and pronunciation. Slav 41 is prerequisite to Slav 42. (Academic year 1975–76 and alternate years)

47 **Beginning Russian for Reading** (3) Staff
For students with little or no knowledge of Russian who wish to learn to read the language only. Credit assigned only after completion of Slav 49. No academic credit for graduate students. (Fall)

49 **Russian Reading** (3) Staff
Primarily for graduate students preparing for reading examinations in the natural and social sciences. No academic credit for graduate students. Prerequisite: Slav 47 or equivalent. (Spring)

71 **Introduction to Russian Civilization** (3) Olkhovsky
Survey of Russia's artistic, social, and cultural development. Lectures, discussion, visual aids—in English. (Fall)

91–92 **Introduction to Russian Literature** (3–3) Staff
Emergence and development of Russian literature and ideas during the 19th and early 20th centuries—in English. (Academic year)

SECOND GROUP

101 **Readings in the Soviet Press** (3) Olkhovsky
(*Formerly Slav 101–2 Readings in Modern Russian (3–3)*)
Representative reading and translation of Soviet periodicals and current publications in social sciences. Prerequisite: Slav 4 or 6, or equivalent. (Fall)

104 **Business Russian** (3) Staff
Study of Russian business vocabulary and concepts of business in the Soviet context. Prerequisite: Slav 4 or 6, or equivalent. (Spring)

109–10 **Advanced Russian Conversation and Composition** (3–3) Yakobson
Developing proficiency in oral and written expression. Prerequisite: Slav 10 or equivalent. (Academic year)

125 **Russian Linguistic Structure** (3) Thompson
Linguistic description of standard contemporary Russian. (Fall)

126 **Contrastive Russian-English Analysis** (3) Thompson
Introduction to the basic principles and methods of contrastive linguistics and their application to the analysis of Russian and English structure. (Spring)

128 **Dostoevsky, the Man and the Artist** (3) Nato
Sources and development of Dostoevsky's philosophical, religious, and aesthetic ideas. His influence on Russian and Western literature. Lectures, discussions, and reports—in English. (Fall)

141–42 **Russian Romanticism and Realism** (3–3) Nato
Masterpieces of Russian prose, poetry, and drama of the 19th century—in Russian. Prerequisite: Slav 4 or 6, or equivalent.

143–44 **The Russian Novel** (3–3) Moser

Study of representative novels of the 19th and 20th centuries—in English. (Academic year)

146 **The Russian Short Story** (3) Natov

Historical development of the Russian short story. Lectures, reports, and class analysis—in Russian. (Spring)

151 **Russian Symbolism** (3) Natov

Class analysis of selected texts. Recitations and reports—in Russian. Prerequisite: Slav 4 or 6, or equivalent. (Fall)

152 **Russian Literature after the Revolution** (3) Natov

Russian literature from 1917 to the present; emphasis on poetry and drama. Analysis of selected texts, reports—in Russian. Prerequisite: Slav 4 or 6, or equivalent. (Spring)

153 **Turgenev** (3) Moser

Reading and discussion of Turgenev's works. Emphasis on the novels; major short stories analyzed and some time spent on his plays and other prose works—in English. (Fall)

156 **Leo Tolstoy, His Life and Works** (3) Natov

Evolution of Tolstoy's artistic and philosophical ideas. Tolstoy's impact on Russian literature and society. Lectures, reports, and classroom analysis of his major works—in English. (Spring)

157 **Nabokov** (3) Rowe

Reading and discussion of the major creative works. Russian roots, ordering of reality, sexual symbolism—in English. (Fall)

158 **Solzhenitsyn** (3) Staff

Reading and discussion of the most important stories, novels, and plays by the outstanding contemporary Russian writer—in English. (Spring)

161–62 **Russian Culture** (3–3) Olkhovsky

Survey of Russian cultural heritage from origins of ancient Russia to present—in English. Lecture, recitation, discussion, and individual reports on assigned topics. (Academic year)

165 **Soviet Literature from the Revolution to World War II** (3) Kandel

Basic themes, issues, literary figures of the Soviet 1920's. The fate of literature and writers under increasing state control; Five-year Plan literature. Lecture, discussion, reports—in English. (Fall)

166 **Soviet Literature from World War II to the Present** (3) Kandel

Literature in wartime, under Stalinism, and in the "thaws." The new generation of dissident liberals and "underground" literature. Lecture, discussion, reports—in English. (Spring)

171 **The Russian Intelligentsia** (3) Olkhovsky

Main trends and figures in the evolution of Russian artistic and intellectual life of the 19th century—in English. Lectures, discussion, reports. (Spring)

191 **Russian Literature to 1800** (3) Moser

Survey of Russian literature from the earliest times to the end of the 18th century—in English.

193–94 **The Other Slavs: Their Literature—in English** (3–3) Kandel

An examination of non-Russian Slavic literatures from their beginnings to the present day. Emphasis on themes, ideas, and styles peculiar to each literature. (Academic year)

197 **Methodology of Teaching Russian** (3) Yakobson

Discussion of methods, examination of textbooks, observation of classroom procedures. Prerequisite: 18 semester hours of Russian language. (Spring)

198 **Russian Stylistics** (3) Natov

Development of the Russian language, literary styles, and techniques. words and their aesthetic value, phraseological units, word order, phrase structure. (Spring 1975 and alternate springs)

199–200 **Proseminar: Readings for the Major** (3–3) Staff

Conferences and group discussions. (Academic year)

THIRD GROUP

215 **History of the Russian Language** (3) Thompson

Historical phonology, morphology, and syntax of the Russian language. (Fall 1975 and alternate falls)

216 **Comparative Slavic Structure** (3) Thompson

Study of the structure of Slavic languages other than Russian. Knowledge of a Slavic language other than Russian is helpful, but not required. (Spring 1976 and alternate springs)

225 **Pushkin and the Poets of His Time** (3) Natov

Pushkin's predecessors; Pushkin's lyrics and dramas. Lermontov—the heir to Pushkin's poetic tradition. (Fall 1975 and alternate falls)

253 **Seminar: Literary Criticism** (3) Natov

Study of leading Russian critics and their role in the development of Russian literature; the emergence of various literary schools. (Spring 1976 and alternate springs)

254 **Seminar: Literary and Intellectual Currents of the 1860's** (3) Moser

Discussion of literary and intellectual developments in the Russia of the 1860's. Course conducted in English; a reading knowledge of Russian required. (Spring 1975 and alternate springs)

255 **Seminar: Main Trends in 20th Century Russian Literature** (3) Natov

Study of representative works since 1900; their artistic and social value—in Russian. (Fall 1974 and alternate falls)

295 **Independent Reading and Research** (arr.) Staff

For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

Sociology

Professors R.W. Stephens, I.H. Cisin, R.G. Brown (*Chairman*), T.F. Courtless, Jr.
Associate Professors Patricia Lengermann, Ruth Wallace
Associate Professorial Lecturers Alison Wolf, R.E. Moran, Richard Beizer
Assistant Professors Phyllis Stewart, William Martineau, J.L. Tropea
Adjunct Assistant Professor Eileen Zeitz
Assistant Professorial Lecturers W.R. Throckmorton, B.B. Dunning, D.S. Alterman

Bachelor of Arts with a major in Sociology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding course to be taken in satisfying the requirement for "meaningful initiation" into the Humanities and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Soc 1 and 2.
3. Required courses in related areas—3 semester hours in Statistics (students should consult the departmental adviser regarding the appropriate course); 12 semester hours in *one* of the following related social science fields: Anthropology, Economics, Geography, History, Political Science, and Psychology.
4. Required courses in the major—Soc 101, 141, 149; 15 additional semester hours in second-group Sociology courses.

Master of Arts in the field of Sociology.—Prerequisite: a Bachelor's degree with a major in Sociology or in an approved related field. Applicants should present scores on the Graduate Record Examination, especially in the Verbal and the Quantitative Tests, Test in Sociology, and arrange for former professors to write letters of reference to the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–97. The minimum requirement consists of 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours). All candidates must include in their program of study Stat 105; graduate Sociology courses selected from the following areas: 6 hours chosen from Sociological Theory (Soc 238 and 239 recommended), 6 hours chosen from Social Research Methods, and 6 hours chosen from one of the Department's substantive special fields (Deviant Behavior, Political Sociology, Sociology of Work, or Urban Sociology). All candidates must satisfactorily complete a Master's Comprehensive Examination in Sociological Theory and Social Research Methods, and must complete and orally defend a thesis. Candidates must also fulfill the tool requirement by passing a reading knowledge examination in one foreign language or by satisfactorily completing the tool requirement in either Statistics or computer programming.

Doctor of Philosophy in the field of Sociology.—Required: the general requirements, pages 90–94, 97–99. Students must complete from 30 to 36 semester hours of graduate course work, and from 12 to 18 semester hours of Dissertation Research, for a total of 48 hours beyond the Master's degree. Students must include in their program of study graduate course work in each of the following: 6 semester hours of Sociological Theory (including Soc 333), 6 hours of Social Research Methods, and 6 hours each in two substantive specialties, at least one of which

must be chosen from among those offered by the Department of Sociology—Deviant Behavior, Political Sociology, Sociology of Work, and Urban Sociology. Students must satisfactorily complete the General Examination in Sociological Theory, Social Research Methods, and two substantive specialties. Students must also fulfill the tool requirement by passing a reading knowledge examination in one foreign language and by satisfactorily completing the tool requirement in either Statistics or computer programming.

Departmental prerequisite: Soc 1 is prerequisite to all second- and third-group courses in Sociology.

SOCIOLOGY

FIRST GROUP

1 Introductory Sociology (3) Staff

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior. (Fall and spring)

2 Uses of Sociology (3) Staff

(Formerly American Social Problems)

Introduction to the various methods by which sociologists have approached the investigation of social phenomena. Prerequisite: Soc 1. (Fall and spring)

SECOND GROUP

101 Development of Social Thought (3) Lengermann, Stephens

(Formerly Soc 61)

Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century. Prerequisite: Soc 1. (Fall and spring)

110 The Sociology of Work (3) Brown

Introductory survey of industrial sociology; sociology of occupations and professions; industry-community relations; and analysis of large, complex organizations. (Fall)

124 Medical Sociology (3) Brown

Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services. (Fall)

125 Sociology of Religion (3) Moran, Wallace, Yeide

Introduction to history of the religious area of sociology; analysis of reciprocal impact of secular upon religious and religious upon secular institutions. (Fall)

126 Urban Sociology (3) Martineau, Stephens

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development. (Fall)

127 **Population Problems** (3) Stewart

Composition of populations, trends in population growth and population pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control. (Fall)

128 **Urban Problems and Policies** (3) Martineau

Seminar on urban problems and policies developed in response to them; special focus on Washington, D.C.; students placed in Washington agencies; seminar sessions devoted to social-policy analyses of their experiences. (Spring)

129 **Race and Minority Groups** (3) Wallace

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice. (Spring)

130 **Class, Status, and Power** (3) Stephens

(Formerly Social Stratification)

Analysis of distribution of resources and opportunities for participation, education, and social mobility in American society; international comparisons; analysis of public policies which affect these distributions. (Fall)

132 **Political Sociology** (3) Lengermann, Martineau

Analysis of problems involved in the study of power relations in society; distribution of power in society; types and processes of government; political participation and political mobilization. (Fall)

133 **Sociology of Education** (3) Tropea, Wallace

Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components. (Spring)

135 **Juvenile Delinquency** (3) Courtless, Tropea

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders. (Spring)

136 **Criminology** (3) Courtless, Tropea

Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions in urban society. (Fall)

137 **Sociology of Law** (3) Beizer, Courtless

Law as a social phenomenon and agency of social control. Problems of legal concepts, doctrines, and institutions. Prerequisite: Soc 136. (Fall)

139 **Society and the Deviant** (3) Throckmorton, Tropea

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools. (Spring)

141 **Social Research Methods** (3) Courtless, Cisin

Introduction to scientific method in the development of social theory and

the solution to social problems. Prerequisite: Stat 53 or former 104. (Fall and spring)

143 **Social Movements** (3) Staff

General survey of the various forms of collective behavior (fads, panics, riots, social movements, etc.), and a more detailed study of the genesis, development, and decay of social movements and social revolutions. (Spring)

144 **Public Opinion and Mass Communication** (3) Cisin

Communication process with emphasis on international communications, propaganda, and mass media; measurement of propaganda campaigns. (Fall)

147 **Problems of Bureaucratic Organization** (3) Stewart

Analysis of theories of and behavior in large, bureaucratic organizations and their impact on American social life. Supervised work-practice in the Washington, D.C., community. (Spring)

149 **Modern Sociological Theory** (3) Wallace

Systematic study of contemporary schools of sociological theory, both European and American development; evaluation of scientific contributions of each school. Prerequisite: Soc 61. (Fall and spring)

151 **Problems of Urban Social Systems** (9) Tropea

Developing a comprehensive perspective on selected social problems through lectures and readings. Topic changes each semester. Prerequisite: 24 semester hours selected from economics, history, political science, psychology, and sociology. Admission by permission of instructor. Concurrent registration in Soc 152 required. (Fall and spring)

152 **Problems of Urban Social Systems—Supervised Field Work** (6) Tropea

Accompanies Soc 151. A maximum of 24 hours a week will be spent in service-research efforts by placement in the Washington, D.C., area. Concurrent registration in Soc 151 required. (Fall and spring)

181 **Major Social Problems** (3) Staff

Analysis and examination of various processes in society of general importance to the field of sociology, e.g., social conflict, socialization, social change, etc. Topic changes each semester; may be repeated for credit. (Fall and spring)

191 **Current Emphases in Sociology** (3) Staff

Analysis and evaluation of recent developments in the general field of sociology. Topic changes each semester; may be repeated for credit. (Fall and spring)

192 **Sociology of Urban Youth** (3) Tropea

Analysis of social factors and problems related to the status and behavior of youth in the contemporary urban community; emphasis on roles played by organizations in the major institutional areas of education, the economy, and the family; social control in creating and resolving problems confronting urban youth. (Fall)

195 **Research** (3) Staff

Independent study and special projects. Open only to selected undergraduate students with promising academic records. Before a student is permitted to register for Soc 195, he must submit a written proposal of his plan of study for the approval of the Staff member of the Department who will be directing his research. (Fall and spring)

THIRD GROUP

203 **Social Organization** (3) Wallace

Introduction to sociological concepts and perspectives on society as a system of institutions. Recommended for students offering sociology as a supporting field. (Fall)

210 **Theoretical Foundations of Political Sociology** (3) Lengermann

Sociological theory on the relationship of politics to the wider social system. Emphasis on concepts of power, alienation, ideology, political stability, conflict, and change. (Fall)

212 **Seminar: Political Processes** (3) Lengermann

Sociological studies of political process in the United States; distributions of power; political socialization, attitudes, participation, communication; social movements. Prerequisite: Soc 210. (Spring)

220 **Religious Institutions in Urban America** (3) Yeide

(Formerly Religious Institutions in the United States)

Structural variety of religious institutions and patterns of interaction between religious and secular institutions in contemporary urban life. (Spring 1975 and alternate springs)

223 **Urban Sociology** (3) Martineau

Sociological perspectives on urbanization and urbanism and on the determinants of the forms and structure of the city. (Fall)

224 **Urban Life** (3) Martineau

Examination of differentiation—social, cultural, areal; life styles, territorial groupings, community participation. Prerequisite: Soc 223. (Spring)

230 **Sociological Research Methods** (3) Cisin

(Formerly Social Research Methods)

Systematic survey of sociological research strategies and review of the literature in this area. Recommended for students with only one undergraduate course in research techniques. Prerequisite: Soc 141 or equivalent. (Fall)

231 **Seminar: Advanced Research Methods** (3) Cisin

(Formerly Advanced Social Research Methods)

Intensive study and evaluation of a few sophisticated research techniques and of new developments in the methodology of social research. Prerequisite: Soc 230 or equivalent. (Spring)

232 **Seminar: Research Planning and Execution** (3) Cisin, Stewart

Clinical review of student research projects; recommended for students engaged in thesis and dissertation research. Prerequisite: Soc 230 or equivalent. (Spring)

238 **Seminar: Development of Sociological Theory** (3) Lengermann
Development of sociology from the early 1800's to the 1920's. Intensive analysis of the classical theoretical statements. (Fall)

239 **Seminar: Modern Sociological Theory** (3) Lengermann, Wallace
Intensive examination and evaluation of contemporary schools of sociological theory in Europe and America. Advanced analysis of theoretical perspectives. Prerequisite: Soc 238. (Spring)

240 **Sociology of Work and Occupations** (3) Stewart, Brown
(Formerly Sociology of Occupations)
Analysis of occupational roles and structures; recruitment and training; adjustment problems at various career stages; interrelationships of stratification, life styles, and work roles. (Fall)

241 **Sociology of Work and Organizations** (3) Stewart, Brown
Theory of complex organizations relative to work in industry, government, and business; examination of basic processes such as decision-making, recruitment, allocation of authority, informal organization, and interorganizational relations. (Spring)

242 **Seminar: Urban Medical Systems** (3) Brown
(Formerly Seminar: Problems in Medical Sociology)
Sociological analysis of various problems in urban medical systems, e.g., delivery of health care services, interprofessional relationships, community health care, etc. (Spring)

*259 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3) (Same as Law 475 (2)) Courtless

*261 **Law and Criminology II: Society's Responses to the Criminal Offender** (3) (Same as Law 476 (2)) Courtless

265 **Seminar: Criminal and Juvenile Justice Systems** (3) Courtless, Tropea
Development of a systematic perspective on components and relationships constituting the juvenile and criminal justice systems. (Spring)

295 **Research** (arr.) Staff
Independent study and special projects. Before a student is permitted to register for Soc 295, he must submit a written proposal of his plan of study for the approval of the Staff member of the Department who will be directing his research. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

FOURTH GROUP

333 **Seminar: Theory Construction and Application** (3) Tropea, Wallace
(Formerly Soc 233)
Critical examination of the elements of current theories in the social sciences with the major objective of developing general principles of

* Students registering for Soc 259 or 261 make special arrangements with the instructor for supplementary assignments equivalent to one additional semester hour. For description of the courses, see the *National Law Center* catalogue.

theory construction; consideration of the functions of theory in sociological research. (Fall)

351 **Selected Topics in Sociology** (3) Staff

Intensive investigation of special topics in sociology. May be repeated for credit. The following topic(s) will be offered as the demand requires each fall semester: (1) *Social Research*—causal inference in social research, evaluation research, philosophy of science, etc.; (2) *Political Sociology*—comparative political structures, processes of policy formation, social movements, etc.; (3) *Sociology of Work*—work and public bureaucracies, industrial sociology, etc.

352 **Selected Topics in Sociology** (3) Staff

Intensive investigation of special topics in sociology. May be repeated for credit. The following topic(s) will be offered as the demand requires each spring semester: (1) *Sociological Theory*—study of important theorists such as Marx, Weber, Parsons, important themes such as social change, social control; important schools such as symbolic interactionism, general systems theory. (2) *Urban Sociology*—ecological processes, suburbanization, the urban school, race and ethnic relations, etc.; (3) *Law and Society*—the police and the community, the sociology of law, theories of deviance, etc.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Spanish

See "Romance Languages and Literatures."

Special Education

Professor Perry Botwin (*Chairman*)
Associate Professors R.S. Cottrell, Jr., Rita Ives
Assistant Professors M.G. Van Dyke, R.W. Prouty, J.R. Shotel, M.S. Castleberry
Instructors Mary Campbell, Joan Landy, Linda Tsantis, Nancy Sobel

Programs of study in Special Education leading to the degrees of *Bachelor of Arts in Education*, *Master of Arts in Education*, and *Doctor of Education* are offered by the School of Education (see pages 102–29).

SECOND GROUP

101 **Seminar: Dimensions of the Complementary Teaching Role** (3) Sobel

Instructional experiences designed to refine the insights and competencies essential for successful operation of the complementary teaching model. (Fall)

102 **Teaching the Child with Special Needs: Methods and Materials** (3) Castleberry

Laboratory course taught in an elementary public school. Students observe and participate in a demonstration seminar conducted by the instructor. Must be taken concurrently with S Ed 189. (Fall)

103 **Teaching the Child with Special Needs: Creative Programming** (3) Castleberry

Continuation of S Ed 102. Concentration on the total programming of the child with special needs. Must be taken concurrently with S Ed 190. (Spring)

170 **Interpersonal/Intrapersonal Relationships for Special Education Teachers** (3) Castleberry

Consideration of factors leading to successful interaction with children. (Fall)

189 **Preprofessional Internship: Observing the Special Child in the Regular Class Milieu** (3) Castleberry

Supervised internship in school setting. Emphasis on intensive study of a child evidencing special needs. Must be taken concurrently with S Ed 102. (Fall)

190 **Preprofessional Internship: Inspecting a Continuum of Special Education Services** (3) Castleberry

Observation and participation in various special education settings. Emphasis on exposure to and familiarity with goals and programs of various special education models. Must be taken concurrently with S Ed 103. (Spring)

197–98 **Special Study in Special Education** (3–3) Castleberry, Sobel

Individual or group study or research under the guidance of staff members. Program and conferences arranged with adviser. Admission by permission of adviser. (Academic year)

199 **Internship in Complementary Teaching** (6) Sobel

Supervised teaching internship in a school-based intervention program. Student teaching with children identified as needing special education services. A minimum of 210 clock hours required. Admission by permission of the instructor.

200 **Understanding Young Exceptional Children** (3) Shotel

Lecture and field experience. Application of the basic concepts of early child development as applied to special education. (Fall)

THIRD GROUP

201 **Introduction to Special Education** (3) Botwin

Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accomodate children in a school program. (Fall)

222 **Special Education in the Regular Classroom** (3) Landy

Special techniques and materials for regular classroom teachers to assist children who have learning and/or behavior problems; emphasis on specific, practical strategies and applications. Open to undergraduate seniors. (Spring)

240 **The Crisis-Resource Teacher** (3) Van Dyke

(Formerly Educational Programming for Children with Behavioral Problems)

Rationales, operational models, techniques, and problems relevant to the implementation of crisis-resource teacher programs. (Fall)

241 **Preprofessional Internship: Crisis-Resource Teaching** (6) Van Dyke and Staff

Practicum experience early in the training sequence in crisis-resource teaching. Under the direction of qualified teachers in a field setting. A minimum of 280 clock hours required. (Fall)

242 **Specialized Techniques and Materials for Crisis-Resource Teachers** (3) Van Dyke

(Formerly Clinical Teaching of Children with Behavorial Problems)

Lectures, discussions, techniques, and selected materials exploring the psycho-educational factors used in crisis-resource teaching. Admission by permission of instructor. (Fall)

250 **Specialized Techniques and Materials for Diagnostic-Prescriptive Teachers** (3) Landy

Selected materials and techniques used in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 252. Admission by permission of instructor. (Fall)

251 **Psychosocial Factors in Special Education** (3) Prouty

(Formerly Psychosocial Factors in Diagnostic-Prescriptive Teaching)

Psychosocial factors significant to the process of the special education-school based consultant. Admission by permission of instructor. (Fall)

252 **Preprofessional Internship for Diagnostic-Prescriptive Teachers** (6) Landy, Prouty

Supervised school experience in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 250. Admission by permission of instructor. A minimum of 280 clock hours required. (Fall)

253 **The Humanizing Curriculum and the Special Education Consultant** (3) Landy

(Formerly The Humanizing Curriculum in Diagnostic-Prescriptive Teaching)

Curriculum concepts and modifications aimed at enhancing the classroom environment for learning and growth. Admission by permission of instructor. (Fall)

260 **The Assessment Process: Identification and Psycho-educational Assessment of Young Exceptional Children** (3) Ives, Tsantis
(Formerly Identification and Assessment of the Educational Needs of Young Children)
Lectures, demonstrations, and clinical practice in formal and informal assessment procedures. Admission by permission of instructor. (Fall)

261 **The Teaching/Learning Process: Methods and Materials for Young Exceptional Children** (3) Ives, Tsantis
(Formerly Methods for Teaching Young Impaired Children)
Clinical practice in the designing of educational strategies and materials taught in a special education setting. Admission by permission of instructor. (Fall)

262 **Seminar: the Education of Young Exceptional Children** (3) Ives
Weekly seminar dealing with experiences, problems, and concerns encountered during the internship for the education of young exceptional children. Must be taken concurrently with S Ed 292. Admission by permission of instructor. (Spring)

263 **Introduction to the Education of the Severely and Multiply Handicapped** (3) Shotel
Survey of the characteristics and learning patterns of children with severe disabilities. Lecture and field experience. (Fall)

264 **Advanced Study in the Special Education of Severely and Multiply Handicapped Children** (3) Shotel
Specialized programs, techniques, and methods for teaching children with severe disabilities. (Spring)

265 **Clinical Experience with Multiply Handicapped and Developmentally Disabled Young Children** (3) Ives
Preliminary field experience designed for students with no experience in early childhood special education. Supervised experience necessary for program articulation. Three week intensive involvement in an early childhood special education setting.

266 **Problems in Language Development in Exceptional Children** (3) Shotel
Introduction to the study of language acquisition and the application of current research on language of handicapped children. (Fall)

267 **The Role of the Early Childhood Special Educator** (3) Shotel, Tsantis
Examination of the spectrum of roles available in early childhood special education; emphasis on role expectations and psychosocial dynamics of the various settings. (Spring)

268 **The Development of Young Exceptional Children with Emphasis on Handicapping Conditions** (3) Ciardi
(Formerly Pre-school Planning for Children with Disabilities)
Lecture (2 hours), site visitation (3 hours), discussion (2 hours). (Fall)

269 **Psychosocial Concerns of the Early Childhood Special Educator** (3) Ives, Tsantis
(*Formerly Clinical Teaching in Early Childhood Education*)
Seminar involving student presentations focusing on sociological and psychological constructs relevant to interpersonal/intrapersonal relationships. (Fall)

270 **Adapting the Early Childhood Curriculum to Meet Special Needs** (3) Shotel
Review of the basic curriculum areas as they relate to the development of readiness skills in special education. (Spring)

271 **The Interdisciplinary Approach to Planning for the Severely and Multiply Handicapped** (3) Tsantis
Laboratory experience in which students participate as educational members of an interdisciplinary team. (Spring)

290 **Control and Management Techniques in the Classroom** (3) Staff
Examination of the theory, techniques, and tools essential for group control. Designed to provide practice as well as familiarity with the various theories of control of human behavior. Admission by permission of instructor.

291 **Practicum in Crisis-Resource Teaching** (9) Van Dyke and Staff
Supervised field experience in the crisis-resource teacher program. Under the direction of a qualified teacher and the supervision of the University staff. Minimum of 420 clock hours required. (Spring)

292 **Professional Internship in Education of Young Exceptional Children** (9) Ives, Shotel, Tsantis
(*Formerly Practicum in Teaching Young Children in Special Education (6)*)
Supervised internship in the education of young exceptional children. A minimum of 420 clock hours required. Must be taken concurrently with S Ed 262. (Spring)

294 **Practicum in Diagnostic-Prescriptive Teaching** (9) Prouty, Landy
Supervised field experience in diagnostic-prescriptive teacher programs. A minimum of 420 clock hours required. Admission by permission of instructor. (Spring)

297–98 **Individual Study in Special Education** (3–3) Staff
Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. (Academic year)

303 **Administration and Supervision of Special Education** (3) Botwin
Philosophy and nature of special education; litigation, program organization, administration, and development. Surveying local-level needs; program evaluation and supervision. Admission by permission of instructor. (Spring)

304 **Recent Research and Trends in Special Education** (3) Cottrell
Emphasis on research methodology and considerations. The unique problems of doing research in special education. Procedures and sources for

obtaining research funding. Admission by permission of instructor. (Fall)

306 **The Design of Family Education Programs: Theory and Practice** (3) Ives, Tsantis
(Formerly Counseling Families of Children with Special Needs)
Theoretical foundations and clinical practice in working with parents and community agencies in meeting the educational needs of young exceptional children. (Spring)

350 **The Diagnostic-Prescriptive Teacher** (3) Prouty
Rationale, operational models, techniques, and problems relevant to implementation of diagnostic-prescriptive teacher programs. Admission by permission of instructor. (Fall)

351 **Seminar: School-based Consultants in Special Education** (3) Prouty
(Formerly Seminar for Diagnostic-Prescriptive Teachers)
Current practices in regular and special education as they affect the school-based coonsultant; emphasis on concurrent field experience. Admission by permission of instructor. (Spring)

352 **Seminar: Special Education Consultant Programs in the Schools** (3) Prouty
For school-based consultants in special education; focuses on in-school program development and recent trends in processes and procedures. Admission by permission of instructor. (Fall)

370 **Intrapersonal Dynamics in Special Education** (3) Prouty, Van Dyke
Small group exploration of intrapersonal factors essential to understanding roles and interpersonal techniques in teaching exceptional children. Admission by permission of instructor. (Spring)

FOURTH GROUP

401 **Doctoral Mini-Seminar in Special Education** (1) Staff
Participation in a small group with a selected faculty member; intensive study and discussion of an area of common interest in an informal environment providing for the exchange of ideas and optimum potential for personal and professional growth. Admission by permission of instructor. (Fall)

453–54 **Doctoral Internship: Special Education** (6–6) Staff
Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of adviser. (Academic year)

490 **Departmental Seminar in Special Education** (3) Cottrell
Provides an opportunity for selected graduate students to develop, refine, and demonstrate their skills and abilities in a small-group setting with fellow students and department faculty. Admission by permission of instructor. (Spring)

491 **Dissertation Research** (arr.) Staff
(Fall and spring)

Speech and Drama

Professors E.L. Stevens, J.W. Hillis (*Director of Speech Pathology and Audiology*)
Professorial Lecturer Gilbert Herer
Associate Professors Lee Bielski, L.S. Bowling (*Chairman*), W.M. Reynolds (*Director of Forensics*)
Associate Professorial Lecturer B.P. Cox
Assistant Professors Joan Regnell, J.P. Fox, Diane Brewer, N.C. Garner (*Acting Director of Theatre*)
Assistant Professorial Lecturers Jacqueline Dudley, Fairlie Arant, Mary Regan
Instructors V.P. Parady, D.L. Skolnick

Bachelor of Arts with a major in Dramatic Art (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Sp&D 1, 11, 32.
3. Required courses in related areas—24 semester hours of second-group courses outside the Department of Speech and Drama as approved by the major adviser. (Courses in dramatic literature offered in the Classics, English, and foreign language departments are strongly recommended.)
4. Required courses in the major—Sp&D 115, 151, 161–62, 165–66; 6 additional semester hours in second-group drama courses.

Bachelor of Arts with a major in Speech Communication (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirement for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Sp&D 1, 11.
3. Required courses in related areas—6 semester hours in Psychology and 6 semester hours in Philosophy as approved by the major adviser; 12 to 18 semester hours in a single subject area outside the Department of Speech and Drama as approved by the major adviser.
4. Required courses in the major—Sp&D 112, 121, 126, 143, 144; 9 additional semester hours of second-group courses in the Department of Speech and Drama as approved by the major adviser.

Bachelor of Arts with a major in Speech Pathology and Audiology (Departmental).—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Social Studies and the Natural and Mathematical Sciences.)
2. Prerequisite courses—Sp&D 1, 11.
3. Required courses in related areas—Psyc 115, 121, and 131 (or their equivalent), plus 15 additional semester hours of second-group courses selected from related areas as approved by the major adviser.
4. Required courses in the major—Sp&D 101, 103, 104, 106, 118, 119; 6 additional semester hours of courses in the Department of Speech and Drama as approved by the major adviser.

Master of Arts in the field of Speech Pathology and Audiology.—Prerequisite: the degree of Bachelor of Arts with a major in Speech Pathology and Audiology from

this University, or an equivalent degree, and the score on the Aptitude Test of the Graduate Record Examination.

Required: the general requirements, pages 90–97. The program of study consists of 36 semester hours of approved course work without a thesis, or with the approval of the Department, 24 semester hours of approved course work plus a thesis (equivalent to 6 semester hours). All students must satisfy the academic and supervised practicum requirements of the Certificate of Clinical Competence awarded by the American Speech and Hearing Association.

Master of Fine Arts in the field of Dramatic Art.—Prerequisite: the degree of Bachelor of Arts from this University, or an equivalent degree.

Required: the general requirements, pages 90–97. The program of study consists of 30 semester hours of second- and third-group course work in drama and dramatic literature plus the production or direction of a major three-act play, equivalent to 6 additional semester hours.

Bachelor of Arts in Education with a teaching field in Speech and Drama.—Prerequisite: the Education curriculum, pages 76–77.

Required: the Speech and Drama option and the professional courses listed on pages 116, 117.

Speech and Hearing Therapy: See Speech and Hearing Clinic, page 51.

FIRST GROUP

1 **Communicative Speaking and Listening** (3) Reynolds and Staff

Basic theories and principles of speech communication; composition, delivery, and criticism of speaking in interpersonal, group, and public situations. Recording fee, $2. (Fall and spring)

11 **Voice and Diction** (3) Bielski and Staff

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4. (Fall and spring)

32 **Oral Interpretation of Literature** (3) Staff

Theory and practice in discovering and communicating orally the meaning in literature through analysis of form and content. Techniques of reading prose, poetry, and drama for listeners. Prerequisite: Sp&D 11. Recording fee, $2. (Fall and spring)

45 **Understanding the Theatre** (3) Parady

The art of the theatre; its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through lectures, visiting artists, class discussion, and attendance at theatrical performances. Primarily for nonmajors. (Spring)

49 **Rhetoric in Political and Social Action** (3) Reynolds

Study of the use and abuse of rhetoric in contemporary political and social movements. Influence of speech communication on opinion-making examined by means of readings, guest speakers, and field projects. (Fall)

SECOND GROUP

101 **Bioacoustics** (3) Brewer

(Formerly Acoustic Phonetics)

Acoustic analysis of speech and the physiology of reception and processing of speech by the human auditory system. Prerequisite: 3–4 B Sc 11–12, or equivalent; Psyc 1 or 5 or 6, or equivalent. (Fall)

103 **Biophonetics** (3) Staff

Biological bases of speech production. Emphasis on the contribution of the nervous system, the respiratory system, and the vocal and articulatory mechanisms in the production of intelligible speech. Prerequisite: B Sc 3–4, 11–12, or equivalent; Psyc 1 or 5 or 6, or equivalent. (Fall)

104 **Introduction to Speech Pathology** (3) Regnell

Survey of the field of speech pathology. The effect of body-system pathologies and environmental factors on the production of speech and language. Prerequisite: B Sc 3–4, 11–12, or equivalent; Psyc 1 or 5 or 6, or equivalent. (Spring)

106 **Introduction to Audiology** (3) Brewer, Bowling

(Formerly Sp&D 182)

Survey of the field of audiology. The effect of body-system pathologies on the reception of speech and other acoustic stimuli. Procedures of pure-tone and speech audiometry. Clinical and educational services for the hearing impaired. Prerequisite: Sp&D 101. (Spring)

111 **Business and Professional Speaking** (3) Stevens

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors. (Fall)

112 **Advanced Public Speaking** (3) Reynolds

In-depth study of and practice in the principles and techniques of persuasive speaking, with emphasis on the psychological factors in audience analysis and adaptation. Prerequisite: Sp&D 1 or permission of instructor. (Spring)

115–16 **Acting** (3–3) Parady

Study and practice of fundamentals of acting technique: sense memory, improvisation, character analysis, role development. Prerequisite: Sp&D 32. (Academic year)

118 **Structural Analysis of Speech and Language** (3) Fox

Development of skill in the application of generative and transformational grammars; phonetic/phonemic transcription systems for the analysis of speech and language. Prerequisite: Psyc 115 or equivalent. (Spring)

119 **Clinical Procedures for Communication Disorders** (3) Hillis

Development of skill in precision treatment techniques for communication disorders. Emphasis on accountability of providers of clinical and educational services for the communicatively handicapped. Prerequisite: Psyc 121 and 131, or equivalent; senior standing or permission of instructor. (Fall)

121 **Group Discussion and Conference Leadership** (3) Stevens

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: Sp&D 1 or permission of instructor. (Fall and spring)

126 **Argumentation and Debate** (3) Reynolds

Study of the advocacy system; special emphasis on issue identification, use of evidence, and logical proof. Extensive practice in argumentative speaking. Prerequisite: Sp&D 1 or permission of instructor. (Spring)

127–28 **Advanced Debate Practice** (1–1) Reynolds

Admission by permission of instructor, after one semester of satisfactory participation in intercollegiate debate program. May be repeated for a total of 4 semester hours of credit. (Academic year)

133 **Broadcasting in America** (3) Skolnick

(Formerly Radio and TV Broadcasting)

Study of the origins, structure, and nature of American broadcasting with emphasis on communicative factors and effects of television programming. (Fall)

134 **Radio Production and Performance** (3) Skolnick

(Formerly Radio and TV Broadcasting)

Introduction to the basic concepts of radio as a communication medium; emphasis on the design and production of a variety of radio programs. Prerequisite: Sp&D 133 or permission of instructor. Recording fee, $5. (Spring)

135–36 **Radio Workshop** (1–1)

Practical work in campus radio station. Admission by permission of instructor, after one semester of satisfactory participation in WRGW activities. May be repeated for a total of 4 semester hours of credit. (Academic year)

143 **Origins of Contemporary Rhetorical Theory** (3) Reynolds

Study of rhetorical theory and method as they evolved in the Western world from the classical period to the present. (Fall)

144 **History and Criticism of American Public Address** (3) Reynolds

Study of American oratory from its pre-Revolution origins to the present day, interpreted in terms of issues and movements. (Spring)

151 **Stagecraft** (3) Staff

Lecture (2 hours), laboratory (1 hour). Theories and practicum in the technical aspects of production. (Fall)

152 **Advanced Stagecraft** (3) Staff

Lecture (2 hours), laboratory (1 hour). Theories and practicum in production, staging, and scenic design. Prerequisite: Sp&D 151 or permission of instructor. (Spring)

154 **Play Directing** (3) Garner

Fundamentals of play directing. Studies in dramatic composition, character analysis, casting, rehearsing, play analysis. Under supervision of instructor, students cast and prepare scenes for presentation. Prerequisite: Sp&D 115. Laboratory fee, $5. (Fall)

155–56 **Play Production Practice** (1–1) Staff

Practical work in theatre: assigned production duties, special projects under instructor's supervision. May be repeated for a total of 4 semester hours of credit. Admission by permission of instructor. (Academic year)

161–62 **Theatrical Styles** (3–3) Garner

Historical and critical study of significant plays and production methods. Sp&D 161: to the Restoration. Sp&D 162: since the Restoration. (Academic year)

165–66 **History of the Theatre** (3–3) Parady

An examination of the development and growth of the theatre from its beginnings to the present. Sp&D 165: Greek through Restoration. Sp&D 166: the 18th century to the present. (Academic year)

169 **Introduction to Creative Dramatics** (3) Staff

Study of philosophies and practices underlying dramatics with children; materials and methods for conducting improvised dramatic activities in elementary and secondary education. (Spring)

*192 **The American Cinema** (3) Staff

History and criticism of American films. At least one film will be shown each week, on which there will be readings, discussions, and lectures. The course will enable the student to develop an ability to see and evaluate cinema techniques, to express the evaluation clearly in writing, and to understand the role of films in the context of American culture. The American Film Institute's Rediscovery Series will be used as a laboratory. Subscription to the Series is $15, payable to the American Film Institute.

193 **Design** (3) Staff

Fundamental study of principles and concepts of theatre design. (Fall)

195 **Costuming** (3) Parady

Study of costume history, materials, and construction. (Spring)

THIRD GROUP

Sp&D courses numbered from 268 through 290 and Sp&D 295 are for Master of Arts candidates in the field of Speech Pathology and Audiology; other students may be admitted by permission of the Department.

215–16 **Advanced Acting** (3–3) Staff

Study of character analysis, transactional analysis, exercise principles, improvisation, and styles. (Academic year 1974–1975 and alternate years)

251 **Advanced Design** (3) Staff

Fundamental study of principles and concepts of theatre design. (Spring 1975 and alternate springs)

* Joint offering of the Department of Speech and Drama and the American Studies Program. Students may register under either designation.

252 Advanced Costuming (3) — Parady
Study of costume history, materials, and construction. (Spring 1976 and alternate springs)

255 Lighting (3) — Garner
Theory and practice of stage lighting. (Fall 1975 and alternate falls)

256 Advanced Directing (3) — Staff
Play analysis, character analysis; directing of scenes and one-act plays under supervision. (Spring 1976 and alternate springs)

257 Modern Trends (3) — Staff
Study of recent trends in theatrical criticism, theory, and play production. (Fall 1974 and alternate falls)

258 Theatre Management (3) — Parady
Theory and practice in the psychology of handling the public: promotion, box office and house management. Admission by interview. (Fall 1975 and alternate falls)

268 Clinical Practice in Communication Disorders (arr.) — Staff
Supervised clinical practice in the evaluation and treatment of communication disorders. May be repeated for a total of 3 semester hours of credit. (Fall and spring)

269 Community Programs in Communication Disorder (3) — Herer
Methods and procedure for the planning, management, and operation of hospital, school, and other community programs for the communicatively handicapped. (Fall)

271 Articulation Disorders I (2) — Regnell
(Formerly Sp&D 284—Disorders of Articulation (3))
Acquisition of knowledge and of clinical/educational skills in the evaluation and treatment of persons with disorders of speech articulation. Laboratory fee, $5. (Fall)

272 Articulation Disorders II (2) — Hillis
Continuation of Sp&D 271. Laboratory fee, $5. (Spring)

273 Articulation Disorders III (2) — Regnell
Continuation of Sp&D 272. Laboratory fee, $5.

274 Fluency Disorders I (2) — Hillis
Acquisition of knowledge and of clinical/educational skills in the evaluation and treatment of persons with disorders of speech fluency. Laboratory fee, $5. (Fall)

275 Fluency Disorders II (2) — Staff
(Formerly Research Methods in Speech Pathology and Audiology (3))
Continuation of Sp&D 274. Laboratory fee, $5. (Spring)

276 Fluency Disorders III (2) — Hillis
Continuation of Sp&D 275. Laboratory fee, $5.

277 **Language Disorders I** (2) **Fox**
(Formerly Advanced Clinical Procedures in Speach and Hearing)
Acquisition of knowledge and of clinical/educational skills in the evaluation and treatment of persons with disorders in perception or production of oral-verbal language. Laboratory fee, $5. (Fall)

278 **Language Disorders II** (2) **Fox**
(Formerly Advanced Clinical Practice in Speech and Hearing)
Continuation of Sp&D 277. Laboratory fee, $5. (Spring)

279 **Language Disorders III** (2) **Fox**
(Formerly Anatomy and Physiology of Speech and Hearing(3))
Continuation of Sp&D 278. Laboratory fee, $5.

280 **Voice Disorders I** (2) **Regnell**
(Formerly Neurological Speech and Language Disorders (3))
Acquisition of knowledge and of clinical/educational skills in the evaluation and treatment of persons with pathologies or improper use of the larynx or supraglottal resonating cavities. Laboratory fee, $5. (Fall)

281 **Voice Disorders II** (2) **Regnell**
Continuation of Sp&D 280. Laboratory fee, $5. (Spring)

282 **Voice Disorders III** (2) **Regnell**
Continuation of Sp&D 281. Laboratory fee, $5.

283 **Aural Rehabilitation** (3) **Brewer**
(Formerly Sp&D 188)
Systems, principles, and methods of auditory training and speech reading, including development of lesson plans and their application in resolving communication problems of acoustically-handicapped individuals. Laboratory fee, $7.50. (Fall)

284 **Advanced Clinical Audiology** (3) **Bowling**
(Formerly Sp&D 281)
Principles and methods underlying assessment of auditory disorder; emphasis on bone conduction, masking, and speech intelligibility. Clinical implications, tests; demonstration and practicum. Laboratory fee, $7.50. (Fall)

285 **Hearing Aids** (3) **Brewer**
Discussion of hearing-aid characteristics and electroacoustic measurements; hearing-aid effectiveness in improving communicative efficiency; procedures for selection and clinical evaluation of hearing aids; counseling of the patient. (Spring)

286 **Special Auditory Tests** (3) **Bowling**
(Formerly Sp&D 282)
Special speech and pure tone audiometric techniques for differentiating conductive, cochlear, and retro-cochlear lesions, for identifying functional hearing losses. Clinical application of tests and interpretation of results. Laboratory fee, $7.50. (Fall)

287 **Auditory Perception and Comprehension** (3) **Bowling**
Detailed study of the factors which affect auditory perception and compre-

hension; methods and procedures used in identifying disorders of auditory perception and comprehension. Laboratory fee, $7.50. (Spring)

288 **Psychosocial Aspects of Hearing Loss** (3) Bowling
Consideration of the rationale and procedures for evaluating the social and emotional behavior as well as the intellectual potential of those with impaired hearing. Laboratory fee, $7.50. (Spring)

289 **Pediatric Audiology** (3) Cox
Development of skills in audiological assessment of young children and other difficult-to-test groups. Laboratory fee, $7.50. (Spring)

290 **Management of the Hearing-impaired Child** (3) Brewer
Overall management approach to the hard-of-hearing child including diagnosis, parent counseling, amplification, educational placement, treatment programs and procedures, and re-evaluation. Emphasis on aural habilitation within an educational framework. Laboratory fee, $7.50.

294 **Independent Research in Dramatic Art** (arr.) Staff
May be repeated for credit. (Fall and spring)

295 **Independent Research in Speech and Hearing** (arr.) Staff

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Statistics

Professors H.F. Bright, Solomon Kullback (*Emeritus*), H.W. Lilliefors, A.D. Kirsch, R.H. Shumway, Jerome Cornfield (*Chairman*), J.L. Gastwirth, Lawrence Shaw (*Research*)
Professorial Lecturers Samuel Greenhouse, F.C. Leone, Harry Weingarten
Associate Professor C.T. Ireland
Assistant Professors R.E. Thomas, J.P. Dirkse III, J.M. Lachin III (*Research*)
Adjunct Assistant Professor J.K. Kern
Assistant Professorial Lecturers William Rutiser, T.C. Teeples

Bachelor of Arts or *Bachelor of Science with a major in Applied Statistics (Departmental)* or *Mathematical Statistics (Departmental).*—The following requirements must be fulfilled:

1. The general requirements as stated on pages 73, 80–86. (Students should consult the departmental adviser regarding courses to be taken in satisfying the requirements for "meaningful initiation" into the Humanities and Social Studies.)
2. Prerequisite courses for both majors—Math 31, 32; Stat 91, 97.
3. (a) Required course in related areas for the Applied Statistics major—Math 124. (Courses in computer science and some field of application are recommended. Foreign language is not required for this major.)

(b) Required courses in related areas for the Mathematical Statistics major—Math 124, 139, 140, 157; two years of introductory French, German, or Russian, or equivalent. (Courses in computer science, mathematics, and some field of application are recommended.)

4. (a) Required courses in the Applied Statistics major—Stat 113, 117, 118, 157–58, 189; plus three approved second-group courses in Statistics.

(b) Required courses in the Mathematical Statistics major—Stat 117, 118, 157–58, 189–90; plus three approved second-group courses in Statistics.

To assure a balanced program, departmental approval of elective is required for both majors.

Master of Science in the field of Applied Statistics or *Master of Arts in the field of Mathematical Statistics.*—The program of study consists of 30 semester hours of course work without a thesis. In exceptional cases the Department may approve a program of study consisting of 24 semester hours of course work plus a thesis, equivalent to 6 additional semester hours. Candidates must pass a written Master's Comprehensive Examination and must fulfill the tool requirement by passing either a reading knowledge examination in an acceptable foreign language or an examination in computer language. The successful completion of course work in computer programming does not obviate the requirement to pass a special examination should the computer option be elected as a tool. For prerequisites and additional requirements, see below.

Master of Science in the field of Applied Statistics.—Prerequisite: a Bachelor's degree with a major in Applied Statistics from this University, or an equivalent degree. If undergraduate study did not include equivalent required courses at this University, those courses must be taken as prerequisite to graduate study.

Required: the general requirements, pages 90–97, including 18 semester hours of Statistics and 12 additional hours of approved course work in an area of interest to the candidate. Courses are selected in consultation with the adviser.

Master of Arts in the field of Mathematical Statistics.—Prerequisite: a Bachelor's degree with a major in Mathematical Statistics from this University, or an equivalent degree. If undergraduate study did not include equivalent courses at this University, those courses must be taken as prerequisite to graduate study.

Required: the general requirements, pages 90–97, including Stat 201–2 or 257–58; and 217–18. The remaining 18 semester hours must be selected in consultation with the adviser.

Doctor of Philosophy in the field of Mathematical Statistics.—Prerequisite: the degree of Master of Arts in the field of Mathematical Statistics from this University, or an equivalent degree.

Required: the general requirements, pages 90–94, 97–99. A minimum of 24 semester hours of course work must be taken in residence at this University before the General Examination may be completed. The General Examination consists of an oral examination following four days of written examinations: Part I—Matrix Algebra, Real and Complex Analysis; Part II—Probability; Part III and Part IV—Mathematical Statistics. The first two parts of the General Examination may be taken after successful completion of Stat 259–60 or its equivalent; the third and fourth parts may be taken after completion of Stat 257–58, 263–64, 265–66, and a 3-semester-hour seminar. The tool requirement may be fulfilled by passing a reading knowledge examination in one foreign language and an examination in computer language. The successful completion of course work in computer programming does not obviate the requirement to pass a special examination should the computer option be elected as a tool.

Research Fields: Applied Probability, Biostatistics, Design of Experiments, Econometrics, Information Theory, Multivariate Analysis, Operations Analysis, Sampling, and Statistical Inference.

Departmental prerequisite: One entrance unit in algebra is prerequisite to all first-group courses in Statistics.

FIRST GROUP

*51 **Introduction to Business and Economic Statistics** (3) Staff

Lecture (3 hours), laboratory (1 hour). Frequency distribution, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18. (Fall and spring)

*53 **Introduction to Statistics in Social Science** (3) Staff

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, analysis of variance. Laboratory fee, $18. (Fall and spring)

*91 **Principles of Statistical Methods** (3) Staff

Lecture (3 hours), laboratory (1 hour). Variables and attributes, averages and dispersion, frequency distributions and their characteristics, regression and correlation, statistical decision processes. Laboratory fee, $18. (Fall and spring)

97 **Introduction to Computer Programming** (3) Thomas and Staff

Lecture (2 hours), laboratory (2 hours). Computer and programming concepts. High-level language programs written by students will be run on the University computer. Laboratory fee, $25. (Fall and spring)

SECOND GROUP

105 **Statistics in the Behavioral Sciences and Education** (3) Kirsch

Lecture (3 hours), laboratory (1 hour). Advanced study of statistical techniques for research problems. Analysis of variance, correlation techniques, nonparametric techniques, sampling theory. Prerequisite: Stat 53 or former 104. Laboratory fee, $18. (Fall and spring)

107 **Statistics for Engineers** (3) Staff

Probability models, discrete and continuous distributions, sampling, hypothesis testing and estimation, engineering applications. Prerequisite: differential and integral calculus.

109–10 **Quality Control and Reliability Techniques** (3–3) Staff

Statistical methods and probability models for quality control and reliability applications. Prerequisite: Stat 91 or 107.

111 **Business and Economic Statistics I** (3) Staff

Statistical processes as tools in decision-making in areas of economics and business. Admission by permission of instructor. (Fall)

112 **Business and Economic Statistics II** (3) Staff

Case work to illustrate quantitative procedures for solution of economic and business problems. Prerequisite: Stat 111 or equivalent. (Spring)

113 **Computer Programming** (3) Thomas and Staff

Lecture (2 hours), laboratory (2 hours). Computer concepts beyond the introductory level; an introduction to assembly language and advanced

* Stat 51, 53, and 91 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree.

high-level language programming. Prerequisite: Stat 97. Laboratory fee, $25. (Spring)

117 **Analysis of Variance** (3) Staff

Lecture (3 hours), laboratory (1 hour). Introduction to the design of experiments and analysis of variance; random block, factorial, Latin square, and analysis of covariance. Prerequisite: Stat 118. Laboratory fee, $18. (Fall and spring)

118 **Regression Analysis** (3) Staff

Lecture (3 hours), laboratory (1 hour). Regression and correlation theory; simple, partial, and multiple. Prerequisite: 3 semester hours selected from Stat 51, 53, 91, 107. Laboratory fee, $18. (Fall)

119 **Bases of Statistical Decision-making** (arr.) Kern

For students in the Navy Graduate Financial Management Program only. Introduction to techniques of decision-making; emphasis on applications rather than theory.

122 **Forecasting Principles and Techniques** (3) Staff

Survey and appraisal of current economic forecasting techniques and indicators of business conditions. Preparation of an actual forecast. Prerequisite: Stat 51 or equivalent.

*123 **Introduction to Econometrics** (3) Bennett

Construction and testing of economic models: regression theory, parameter estimation, and statistical techniques applicable to economic models. Prerequisite: Econ 101, 102; Math 31 or 51; Stat 111. (Spring)

131 **Contingency Table Techniques** (3) Staff

Analysis of multidimensional contingency tables, including estimation, tests of hypotheses, and log-linear regression. Prerequisite: Stat 118 or permission of instructor. (Fall)

155 **Introduction to Probability** (3) Staff

Probability distribution, Bayes' theorem and postulate, mathematical expectation, laws of large numbers. Prerequisite: one entrance unit in algebra.

157–58 **Introduction to Mathematical Statistics** (3–3) Staff

Distribution theory, sampling theory, estimation, hypothesis testing, regression analysis, experimental design. Prerequisite: differential and integral calculus. (Academic year)

159 **Principles of Bayesian Statistics** (3) Staff

Lecture (3 hours), laboratory (1 hour). Probability as a measure of uncertainty of knowledge; concepts and techniques of Bayesian inference. Prerequisite: 3 semester hours in introductory statistics, or equivalent. Laboratory fee, $13.

161–62 **Information Theory** (3–3) Staff

Elementary development of information theory and applications to communication, coding, psychology, linguistics, etc. Prerequisite: 3 semester hours selected from Stat 107, 155, 157, 159, 189.

* An interdepartmental course offered by the departments of Statistics and Economics.

165–66 **Multivariate Techniques** (3–3) Staff

Application of multivariate statistical techniques to multidimensional research data from the behavioral, social, biological, medical, and physical sciences. Prerequisite: Stat 117, 157–58. (Academic year)

181 **Applied Time Series Analysis** (3) Shumway

Application of time series analysis to data from economics, medicine, and the physical sciences. Fourier methods in regression and analysis of variance, autoregressive and moving average models, signal discrimination and detection. Prerequisite: Stat 117, 118. (Fall)

183 **Intermediate Statistical Laboratory** (3) Staff

Applications to advanced experimental design and other topics. Admission by permission of instructor. Laboratory fee, $25. (Fall or spring)

187 **Theory of Sampling** (3) Staff

Problems of sampling and sample design. Prerequisite: Stat 91 or equivalent. (Fall)

188 **Nonparametric Statistical Inference** (3) Lilliefors

Statistical inference when the form of underlying distribution is unspecified. Prerequisite: Stat 91 or equivalent. (Spring)

189–90 **Mathematical Probability and Applications** (3–3) Staff

Combinatorial analysis, conditional probability, stochastic independence, probability distributions, random variables, laws of large numbers. Prerequisite: differential and integral calculus. (Academic year)

191 **Probabilistic Methods for Operations Research** (3) Staff

Primarily for students in the School of Engineering and Applied Science. Axiomatic theory, random variables, Bayes' theorem, some special distributions, generating functions, convergence, Poisson and Markov processes. Prerequisite: Ap S 115 or equivalent. (Fall)

192 **Statistical Methods for Operations Research** (3) Staff

Primarily for students in the School of Engineering and Applied Science. Sampling, estimation, sampling distributions, hypothesis testing, the general linear hypothesis, experimental design models, elements of sequential analysis and nonparametric statistics. Prerequisite: Stat 191 or equivalent. (Spring)

195 **Reading and Research in Statistics** (arr.) Staff

May be repeated once for credit. (Fall and spring)

197 **Digital Computer Programming with Applications** (3) Thomas

Lecture (2 hours), laboratory (2 hours). Use of digital computer in statistical and other computational work. Writing, debugging, and running programs on the digital computer in the University Computer Center. Prerequisite: Stat 117; or Math 32; or permission of instructor. Laboratory fee, $25. (Spring)

198 **Current Topics in Computer Programming** (3) Staff

Concepts of programming, programming languages, operating systems, nonnumeric programming compiler techniques. Prerequisite: Stat 113 or permission of instructor. Laboratory fee, $25. May be repeated for credit. (Fall)

THIRD GROUP

201–2 **Mathematical Statistics** (3–3) Staff

Distribution theory, sampling theory, estimation, sufficient statistics, hypothesis testing, analysis of variance, multivariate normal distribution. Prerequisite: advanced calculus. (Academic year)

205 **Data Analysis for Educational Policy Decisions** (3) Kirsch

The framing of questions of importance in educational policy and the use of existing data bases to answer these questions. Laboratory fee, $20.

206 **Factor Analysis** (3) Kirsch

Concepts of factor analysis and their utility in various phases of research and related topics. Prerequisite: Stat 105 or equivalent. Laboratory fee, $18. Not open to graduate students in Statistics.

207–8 **Operations Analysis** (3–3) Staff

Basic concepts and techniques. Introduction to simulation, linear programming, game theory, queuing theory, inventory theory, and other topics. Admission by permission of instructor. (Academic year)

217–18 **Advanced ANOVA and Experimental Design** (3–3) Staff

Advanced theory and application of general linear hypothesis to experimental designs. Prerequisite: Stat 157–58 or 201–2. (Academic year)

221 **Design of Experiments for Behavioral Sciences and Education** (3) Kirsch

Applications of advanced experimental design to research problems in behavioral sciences and education. Prerequisite: Stat 105 or 117 and permission of instructor. Not open to graduate students in Statistics. (Spring)

225–26 **Introduction to Biostatistics** (3–3) Cornfield

Probability models, inference, and study design as applied to biomedical investigations. Prerequisite: Math 31 or permission of instructor. (Academic year)

231 **Contingency Table Analysis** (3) Staff

A study of the theoretical bases underlying the analysis of categorial data. Prerequisite: Stat 201–2 or 257–58.

242 **Advanced Statistical Problems in Economic Analysis** (3) Gatswirth

Applications of advanced theory to research and decision problems involving economic data.

253–54 **Mathematical Models in Population Genetics** (3–3) Staff

Basic elements of genetics and cell reproduction, deterministic models of gene frequency; the Hardy-Weinberg law; effects of mutation, migration, and selection on gene frequency; multiple loci and multiple allele models; inbreeding; Fisher's fundamental theorem of natural selection; stochastic models of changes in gene frequency, including methods of direct product branching processes and diffusion equation methods. Prerequisite: knowledge of advanced calculus, linear algebra, probability and statistics; or permission of instructor. (Academic year)

257–58 **Distribution Theory** (3–3) Staff

Random variables, distribution functions, moments, sequences of random variables, characteristic functions, special distributions, sampling theory, asymptotic distributions. Prerequisite: Stat 157–58 or 201–2. (Academic year)

259–60 **Advanced Mathematical Probability** (3–3) Staff

Measure theory, probability spaces, random variables, probability distributions, sequences of random variables, conditioning, martingales. Prerequisite: Stat 189–90.

263–64 **Topics in Statistical Inference** (3–3) Staff

Estimation, testing of statistical hypotheses, tests of significance, likelihood ratio, Bayesian inference and the use of prior knowledge, decision and information theory. Prerequisite: Stat 201–2 or 257–58. (Academic year)

265–66 **Multivariate Analysis** (3–3) Staff

Tests of significance, homogeneity, independence, canonical and vector correlations, multivariate normal distribution, generalized Student's ratio, multivariate linear hypothesis, and analysis of variance. Prerequisite: Stat 201–2 or 257–58. (Academic year)

267–68 **Characteristic Functions** (3–3) Staff

Fourier integrals, distribution functions, inversion formulas, limit theorems, applications to the distribution problem of statistics. Prerequisite: Stat 189–90; 201–2 or 257–58.

269–70 **Statistical Decision Theory** (3–3) Staff

Wald's theory of decision functions. Sequential analysis. Multi-decision problems. Existence theorems, complete class theorems, and other general decision theoretic results. Prerequisite: Stat 189–90; and 201–2 or 257–58.

273–74 **Markov Processes** (3–3) Lillefors

Fundamental notions of Markov chains and processes, generating functions, recurrence, limit theorems, random walks, Poisson processes, birth and death processes, applications. Prerequisite: Stat 189–90; and 201–2 or 257–58.

*275 **Econometrics I: Introduction** (3) Bennett

Single equation models of economic behavior. Statistical methods for testing economic hypotheses and estimating parameters. Introduction to simultaneous equations problems. Prerequisite: Stat 157–58 or equivalent or permission of instructor. (Fall)

*276 **Econometrics II: Simultaneous Equations Models** (3) Bennett

Economic models and simultaneous equations systems. Prerequisite: Stat 275. Recommended: a course in matrix theory. (Spring)

*279 **Methods in Economic Statistics** (3) Gastwirth

Applications of statistical methods to economics. Curve-fitting, regression, analysis of variance and chi-square techniques used to analyze economic data. Prerequisite: a year course in Statistics.

* An interdepartmental course offered by departments of Statistics and Economics.

281–82 **Time Series Analysis** (3–3) Shumway

Stationary and nonstationary time series, auto- and cross-correlation, power spectral analysis, multivariate normal processes, mean square estimation and regression, statistical inference, applications. Prerequisite: Stat 189–90; and 201–2 or 257–58. (Academic year)

283 **Advanced Statistical Laboratory** (3) Staff

Application of the University computer to complex statistical problems on an individual study basis. Admission by permission of instructor. Laboratory fee, $25. May be repeated for credit only with permission of the Department. (Fall and spring)

285–86 **Seminar** (3–3) Staff

Admission by permission of instructor. (Stat 285 and 286—fall and spring)

295 **Reading and Research** (3) Staff

May be repeated once for credit. (Fall or spring)

296 **Seminar: Data Analysis Methods** (3) Staff

Case studies, data analysis procedures, and problems that a consultant might encounter.

297 **Problems in Mathematical Statistics** (3) Staff

298 **Seminar: Combinatorial Probability** (3) Staff

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

FOURTH GROUP

*378 **Seminar: Topics in Econometrics** (3) Staff

Limited to graduate students, primarily for doctoral students; offered as demand requires. A research seminar covering current econometric literature and special topics. Admission by permission of instructor.

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Urban and Regional Planning

Professor D.C. McGrath, Jr. (*Chairman*)
Professorial Lecturer Norman Beckman
Associate Professors Sherwin Greene, S.S. Fuller
Associate Professorial Lecturers S.J. Bellomo, R.E. Bonz
Instructor S.E. Girton

* An interdepartmental course offered by departments of Statistics and Economics.

A program leading to the degree of *Master of Urban and Regional Planning*, which provides preparation for professional practice in the planning field, and areas of specialization in planning as components of programs leading to the degrees of *Master of Arts in Government*, *Master of Public Administration*, *Doctor of Business Administration*, and *Doctor of Public Administration*, are offered by the School of Government and Business Administration (see pages 130–59).

SECOND GROUP

153 **Principles of Urban Planning and Design** (3) Staff

Studio course for undergraduates. Basic elements of urban planning and design applied to community problems. Survey of planner's role in developing and implementing creative solutions to urban problems. (Spring)

THIRD GROUP

201 **Introduction to Urban Planning** (3) McGrath, Girton

Introduction to history, concepts, and activities of urban planning. Discussion of trends in urbanism and the influences of technical and social change. (Fall and spring)

202 **Urban Planning Theory** (3) Girton

Development of the fundamental theories and concepts of urban growth and change, urban social structure and change, theories of the planning process, and the role of politics in the planning process. Prerequisite: U&RP 201 or permission of instructor. (Spring)

203 **Fundamentals of Urban Design** (4) Greene

Planning and design studio to develop and apply planning methods and graphic techniques, principles of land use and urban design; analysis of factors affecting community development and change. Open only to candidates for the degree of Master of Urban and Regional Planning. (Fall)

204 **Urban Development Planning** (4) Greene

Planning and design studio: investigation of social, environmental, and technological factors in planning. Application of comprehensive planning process to typical problems of community growth and development. Prerequisite: U&RP 203 or permission of instructor. Laboratory fee, $10. (Spring)

205 **Urban Housing** (3) Fuller

Examination of the housing problem: housing market characteristics, analytical techniques, national needs, costs, financing federal programs, technology, rehabilitation, and policy formulation. Prerequisite: U&RP 201. (Fall)

206 **Community Facilities Planning** (3) Fuller

Planning implications of essential public facilities which comprise community infrastructure. Emphasis on developing an understanding of the special design, service, and locational requirements of each class of community facility, the relationships among facilities, and their effects on urban development and the community at large. Prerequisite: U&RP 201 or permission of instructor. (Spring)

207 Land Development Planning (3) McGrath

Selected problems in urban and regional planning: applications of zoning, urban renewal, and special programs available for the implementation of development plans. Prerequisite: U&RP 201 or permission of instructor. (Fall)

208 Urban Transportation Planning (3) Bellomo

Relationships between land use and the movement of goods and people in urban areas. Transportation planning principles, policy problems, methods for analyzing demand and systems for urban travel; roles of public agencies and private interests in the planning and development of various modes. Prerequisite: Mgt 204, U&RP 201. (Fall)

209 Urban Transportation Models (3) Staff

Consideration of land use activity, trip generation and distribution, modal choice models, traffic assignment, and decision-making techniques. Review of detail studies, calibration, interactions, applications, and accuracy limitations of various mathematical models. Prerequisite: U&RP 208 or permission of instructor.

210 Urban Development Economics (3) Bonz

Economic forces affecting urban growth and change; relationships among cities, metropolitan areas, and regions in the context of the national economy; socioeconomic implications of urban land development policies; basic studies and methods of economic analysis. Prerequisite: Econ 217–18 or equivalent; U&RP 201. (Spring)

213 Social Factors in Urban Planning (3) Girton

Consideration of the impact of social groups, social class, and social institutions on urban structure; development of techniques for reflecting social variables in the planning process. Prerequisite: U&RP 201 or permission of instructor. (Fall)

215 Advanced Planning Problems (4) McGrath and Staff

Investigation of complex problems of the metropolitan region, analysis of findings, formulation of proposals, and presentation of material to faculty and cooperating groups. Multidisciplinary team and individual planning projects. Studio course. Prerequisite: U&RP 204 Laboratory fee, $10. (Spring)

218 Metropolitan and Regional Planning (3) Fuller and Staff

Multidisciplinary study of the methods of regional analysis and process of regional planning; development of projects of regional scale requiring problem analysis, synthesis, and plan formulation. Studio course. Prerequisite: U&RP 204 or permission of instructor. Laboratory fee, $10. (Fall)

232 Urban Environment and the Planner (3) Fuller

Exploration of the relationship between man and his urban environment; emphasis on the role of the urban planner. Theory, research, planning methods, current issues, and laws examined. Prerequisite: U&RP 201 or permission of instructor. (Spring)

240 Federal and State Urban Policy Development (3) Beckman

Investigation of contemporary trends in the evolution of federal and state governmental functions and programs affecting urban growth and

development policy. Planning functions in the evolving relationships among units of federal, state, and metropolitan agencies. Prerequisite: U&RP 201 or permission of instructor. (Fall)

295 **Urban Research** (3) Staff

Directed research and investigation of special problems in community development. May be repeated once for credit. (Fall and spring)

299 **Thesis Seminar** (3) Staff

Examination of thesis standards, research philosophy and methodology. (Fall and spring)

300 **Thesis Research** (3) Staff

(Fall and spring)

FOURTH GROUP

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Business Administration or Doctor of Public Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Business Administration or Doctor of Public Administration candidates. May be repeated for credit. (Fall and spring)

Women Studies—Graduate Study

Professorial Lecturer Marguerite Rawalt
Associate Professorial Lecturer Ruth H. Osborn

COMMITTEE ON WOMEN STUDIES

Ruth H. Osborn (*Coordinator*), Thelma Z. Lavine, Lois G. Schwoerer, Suzanne L. Simons, M. Elizabeth Tidball

The Graduate School of Arts and Sciences offers an interdisciplinary program leading to the degree of Master of Arts in Special Studies with a concentration in Women Studies, directed by the Committee on Women Studies. Each student will work closely with the Committee in designing a program to meet individual interests, goals, and background knowledge. Prospective candidates should consult with the Coordinator of the Committee for specific requirements.

Master of Arts in Special Studies (Women Studies).—Prerequisite: a Bachelor's degree from an accredited college or university. Students are expected to have completed the prerequisites to graduate courses.

Required: the general requirements, pages 90–97. The program of study consists of 36 semester hours with or without a thesis, including a plurality of approved courses in the Arts and Sciences with no more than one-third from any one department. W St 220 and 221 are required courses for all students; W St 283 and 295 are required for students *not electing* a thesis; W St 299–300 is required for those *electing* a thesis. All candidates are required to pass a Master's Comprehensive Examination. There is no tool requirement.

THIRD GROUP

220 **Selected Topics on Women** (3) Staff

Research and theory from the following: anthropology, economics, history, literature, philosophy, physiology, psychology, and sociology. (Fall and spring)

221 **Seminar: Women in Perspective** (3) Staff

Past, present, and future roles of women based on interdisciplinary study. Prerequisite: W St 220. (Fall and spring)

231 **Women and the Law** (3) Rawalt

An examination of the status of women in selected areas of the law. Emphasis on employment, health and welfare services, education, and public accommodations. (Fall)

235 **Counseling and Career Development of Women** (3) Osborn

Multidimensional analysis of factors, theories, problems, and practices in career development and its relationship to counseling women.

283 **Practicum in Women Studies** (3) Staff

Field experience in agencies engaged in counseling, instruction, or supervision of women, and in related research.

295 **Independent Research in Women Studies** (arr.) Staff

Supervised independent research. Students will be expected to contribute to the present body of knowledge in the historical, literary, or statistical study of women.

299–300 **Thesis Research** (3–3)

Zoology

See "Biological Sciences."

FACULTY AND STAFF OF INSTRUCTION

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

GRADUATE SCHOOL OF ARTS AND SCIENCES

SCHOOL OF EDUCATION

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

EMERITI

Caroline Lander Adams, *Professor Emeritus of Botany*
B.A. 1925, Illinois College; M.S. 1928, University of Chicago; Ph.D. 1932, University of Wisconsin-Madison

Errett Cyril Albritton, *Professor Emeritus of Physiology*
B.A. 1916, University of Missouri-Columbia; M.D. 1921, Johns Hopkins University

Grover LaMarr Angel, *Professor Emeritus of Education*
B.A. 1929, High Point College; M.A. in Ed. 1946, Ed.D. 1952, George Washington University

Ruth Harriet Atwell, *Professor Emeritus of Physical Education for Women*
Ph.B. 1918, Denison University; M.A. in Ed. 1933, George Washington University

Gretchen Rogers Bolwell, *Professor Emeritus of German*
B.A. 1930, M.A. 1931, George Washington University; Ph.D. 1938, Johns Hopkins University

Robert Whitney Bolwell, *Professor Emeritus of American Literature*
B.A. 1916, Case Western Reserve University; M.A. 1917, Ph.D. 1921, Columbia University; Litt.D. 1957, George Washington University

Paul William Bowman, *Professor Emeritus of Biology*
B.A. 1924, University of Pennsylvania; M.A. 1928, George Washington University; Ph.D. 1930, University of Virginia

John Withrow Brewer, *Professor Emeritus of Political Science and International Law*
B.A. 1926, M.A. 1930, Ph.D. 1932, Princeton University

Arthur Edward Burns, *Professor Emeritus of Economics*
B.A. 1931, M.A. 1934, University of California, Berkeley; Ph.D. 1935, George Washington University

Elizabeth Burtner, *Professor Emeritus of Physical Education*
B.A. 1927, Hood College; M.A. 1935, Columbia University

Paul Calabrisi, *Professor Emeritus of Anatomy, in Residence*
B.A. 1931, Catholic University of America; M.A. 1940, George Washington University; Ph.D. (Cantab.) 1955, University of Cambridge, England

Richard Bernard Castell, *Director Emeritus of the Student Health Service*
B.A. 1932, M.D. 1935, George Washington University

James Harold Coberly, *Professor Emeritus of English, in Residence*
B.A. 1933, M.A. 1938, Ph.D. 1949, George Washington University

Elbridge Colby, *Professor Emeritus of Journalism*
B.A. 1912, M.A. 1913, Ph.D. 1922, Columbia University

Oswald Symister Colclough, *Professor Emeritus of Law; Dean of Faculties Emeritus; Emeritus Director of the Patent, Trademark, and Copyright Research Institute*
B.S. 1920, United States Naval Academy; LL.B. 1935, Sc.D. 1961, George Washington University; LL.D. 1946, Muhlenberg College

Charles William Cole, *Professor Emeritus of English*
B.A. 1930, M.A. 1931, Ph.D. 1939, George Washington University

George Frederick Conner, *Associate Professor Emeritus of Business Administration*
B.S. 1929, United States Military Academy; M.B.A. 1938, Harvard University

Vincent James DeAngelis, *Professor Emeritus of Physical Education*
B.S. in P.E. 1939, M.A. in Ed. 1948, George Washington University

Alan Thomas Deibert, *Professor Emeritus of Romance Languages*
B.A. 1918, Gettysburg College; M.A. 1922, Harvard University

William Webster Diehl, Professor *Emeritus of Mycology*
B.A. 1914, Miami University; M.S. 1915, Iowa State University of Science and Technology; Ph.D. 1932, Harvard University

William Rankin Duryee, *Research Professor Emeritus of Pathology (Experimental)*
B.A. 1927, Ph.D. 1933, Yale University

Frederick Harrell Gibbs, *Professor Emeritus of Health Care Administration*
B.S. 1958, University of Maryland; M.H.A. 1959, University of Minnesota

Wood Gray, *Professor Emeritus of American History*
B.A. 1927, M.A. 1928, University of Illinois at Urbana-Champaign; Ph.D. 1933, University of Chicago

Ira Bowers Hansen, *Professor Emeritus of Zoology*
B.S. 1928, M.A. 1929, Wesleyan University; Ph.D. 1932, University of Chicago

Henry William Herzog, *Vice President and Treasurer Emeritus*
B.S. in C.E. 1930, George Washington University

Thomas Willard Holland, *Professor Emeritus of Labor Economics*
B.A. 1923, University of Michigan; LL.B. 1934, Columbia University; Ph.D. 1939, University of Wisconsin-Madison

Averett Howard, *Professor Emeritus of English Composition*
B.A. 1922, University of California, Berkeley; M.A. 1940, Cornell University

Thelma Hunt, *Professor Emeritus of Psychology, in Residence*
B.A. 1924, M.A. 1925, Ph.D. 1927, M.D. 1935, George Washington University

Herbert Jehle, *Professor Emeritus of Physics*
Dr.Ing. 1933, Institute of Technology, Berlin

Everett Herschel Johnson, *Professor Emeritus of Statistics*
B.A. 1926, DePauw University; M.A. 1929, Lehigh University; Ph.D. 1942, University of Michigan

Francis Edgar Johnston, *Professor Emeritus of Mathematics*
B.A. 1921, George Washington University; M.A. 1923, Ph.D. 1926, University of Illinois at Urbana-Champaign

Elmer Louis Kayser, *Professor Emeritus of European History; Dean Emeritus of the Division of University Students*
B.A. 1917, M.A. 1918, LL.D. 1948, George Washington University; Ph.D. 1932, Columbia University

Frances Kirkpatrick, *Professor Emeritus of Home Economics*
B.S. 1919, University of Missouri-Columbia; M.A. 1929, Columbia University

Donald Chenoweth Kline, *Professor Emeritus of Art, in Residence*
B.Arch. 1927, George Washington University; M.F.A. 1951, Catholic University of America

Wolfgang Herbert Kraus, *Professor Emeritus of Political Science and International Affairs*
Dr.Jur. 1929, University of Frankfurt; S.J.D. 1931, Harvard University

Solomon Kullback, *Professor Emeritus of Statistics, in Residence*
B.S. 1927, City University of New York, City College; M.A. 1929, Columbia University; Ph.D. 1934, George Washington University

John Francis Latimer, *Professor Emeritus of Classics*
B.A. 1922, Litt.D. 1964, Mississippi College; M.A. 1926, University of Chicago; Ph.D. 1929 Yale University

Helen Bennett Lawrence, *Professor Emeritus of Physical Education for Women*
B.S. in P.E. 1934, M.A. 1938, George Washington University

Chester Elwood Leese, *Professor Emeritus of Physiology*
B.A. 1922, M.A. 1925, Ph.D. 1930, University of Iowa

Wolfram Karl Legner, *Professor Emeritus of German*
B.A. 1923, Harvard University; M.A. 1932, Ph.D. 1936, University of Pennsylvania

Kurt London, *Professor Emeritus of International Affairs*
Ph.D. 1923, University of Würzburg

John Russell Mason, *Librarian Emeritus; Curator of Art Emeritus*
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APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs†

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

of The George Washington University as soon after order is restored as is practicably possible.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

* Amended January 18, 1973.

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established with the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

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NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

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SCHOOL OF MEDICINE AND HEALTH SCIENCES, Admissions Office, School of Medicine and Health Sciences

SUMMER SESSIONS CATALOGUE, Dean of the Summer Sessions

SCHEDULE OF CLASSES: FALL AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Asso
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Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelo
of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc
and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master o
Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A
Master of Forensic Sciences (M.Forens.S.), Master of Music (Mus.M
Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers
Master of Science in Forensic Science (M.S. in Forens.S.), Master of Scienc
in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S
Bachelor of Science in Allied Health Science (B.S. in A.H.S.) Bachelor o
Science in Environmental Health (B.S. in Env.Health), Bachelor of Scienc
in Medical Technology (B.S. in Med.Tech.), and Doctor of Medicine (M.D

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Maste
of Comparative Law (M.Comp.L.), Master of Comparative Law (America
Practice) (M.Comp.L. (Am.Prac.)), and Doctor of Juridical Science (S.J.D

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil En
gineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S
(E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.
Master of Engineering Administration (M.E.A.), Master of Science (M.S.), an
Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelo
of Science in Physical Education (B.S. in P.E.), Master of Arts in Educatio
(M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialis
(Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business
Administration (B.B.A.), Bachelor of Science in Administration (B.S.
Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.
Master of Arts in Government (M.A. in Govt.), Master of Arts in Hea
Care Administration (M.A. in H.C.A.), Master of Business Administratio
(M.B.A.), Master of Public Administration (M.P.A.), Master of Science
Administration (M.S. in Adm.), Master of Urban and Regional Plann
(M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Ca
Administration (Grad.Cert. in H.C.A.), Doctor of Business Administratio
(D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.) an
Master of Arts (M.A.)

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THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

THE DIVISION OF EXPERIMENTAL PROGRAMS, 1973

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WASHINGTON, D.C. 20006

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1974-1975



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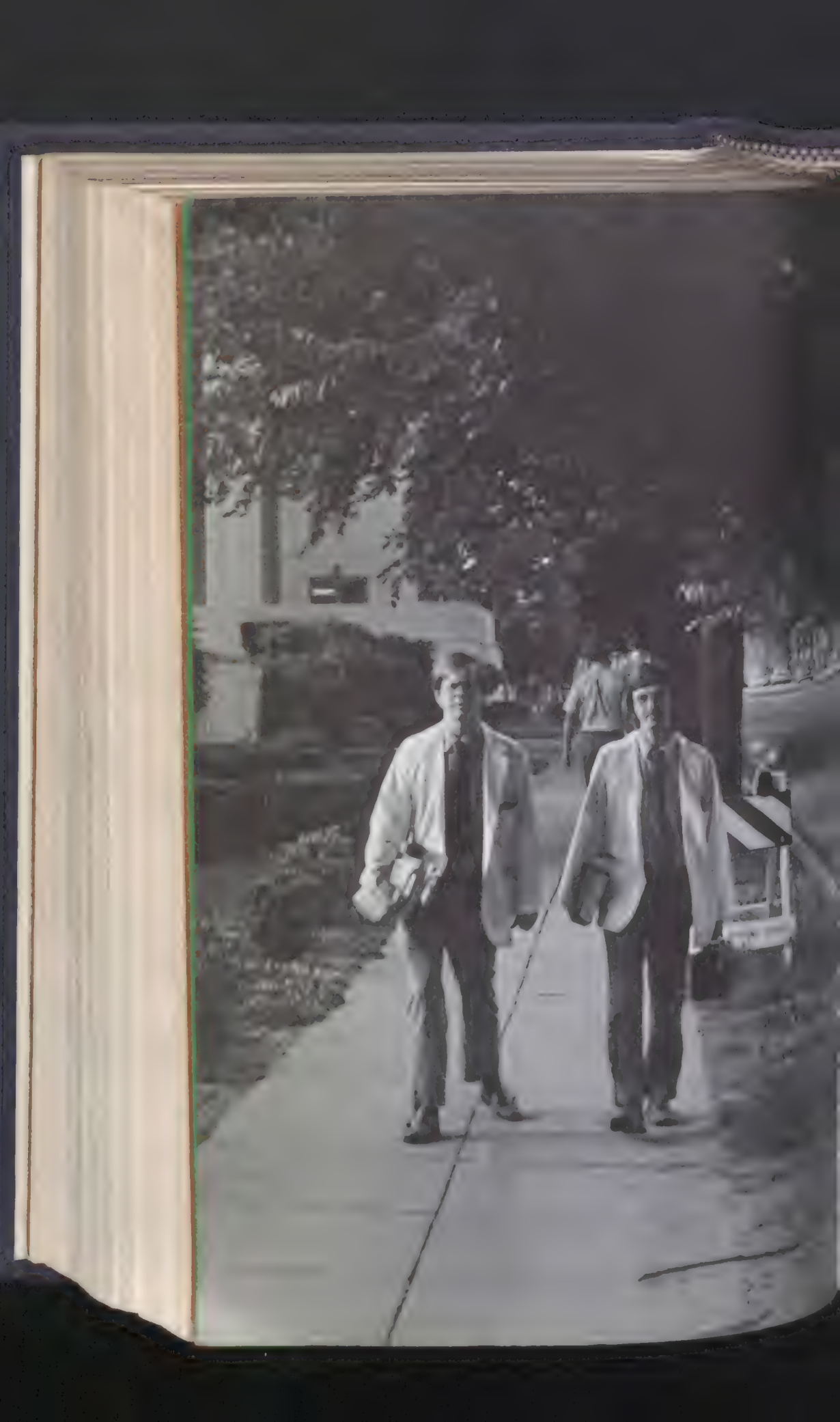
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AUGUST 1974

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August 29–30	Orientation for 1st-year medical students, *Thursday–Friday*
September 3	Registration *Tuesday*
September 4	Classes begin *Wednesday*
November 27	Thanksgiving recess for undergraduate and 1st- and 2nd-year medical students begins after last class *Wednesday*
December 2	Classes resume *Monday*
December 20	Christmas recess for undergraduates and 1st-, 2nd-, and 3rd-year medical students begins after last class *Friday*
January 6	Classes resume *Monday*
January 14	Registration *Tuesday*
February 17	Winter Convocation (holiday) *Monday*
March 25	Spring recess for undergraduates and 1st-, 2nd-, and 3rd-year medical students begins after last class *Tuesday*
April 3	Classes resume *Thursday*
May 16	Last day of classes *Friday*
May 20–23	Examination period *Tuesday–Friday*
May 24	Commencement *Saturday*

* This Calendar is subject to change. Although registration is conducted in both September and January, there is no precise date for the end of the fall semester; some courses end before the Christmas recess while others begin before the January registration. See the *School of Medicine Schedule of Classes* for exact time of course offerings

THE UNIVERSITY

HISTORY AND ORGANIZATION

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. Within a few squares are the White House, the Department of the Interior, the State Department, the World Bank, and many other governmental offices and international agencies. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 201 E Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine and Health Sciences, Engineering and Applied Science, Education, Government and Business Administration, and Public and International Affairs; the College of General Studies; the Division of University Students; the Division of Experimental Programs; and the Summer Sessions.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools. The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board. The Department of Chemistry is on the approved list of the American Chemical Society.

The School of Medicine and Health Sciences has had continuous approval by the Council on Medical Education of the American Medical Association and the Association of American Medical Colleges. The Doctor of Medicine degree of the School of Medicine and Health Sciences is recognized by all state and territorial medical licensure boards in the United States.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

The Center Governing Board, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. This Board works closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

RECREATION

The Nation's capital provides abundant recreational resources, a large number of which are available at little or no cost. There are numerous art galleries,

museums, concert halls, theaters, swimming pools, parks, and places of great historic interest. Social activities are provided by student organizations of the University, the School of Medicine and Health Sciences, and University-sponsored programs such as intramural sports, concerts, recitals, and dramatic productions. Religious faiths are well represented in the Washington metropolitan area. Washington is one of the most colorful cultural and scientific centers of the world.

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*Sidney A. Levine, B.A., M.D.
Franklin J. Lunding, LL.B., LL.D.
Jeremiah Milbank, Jr., B.A., M.B.A.
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Flaxie M. Pinkett, B.A.
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Joseph Young Ruth, B.A., *Director of Admissions*

* Alumni trustee.

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES

OFFICERS OF ADMINISTRATION OF THE MEDICAL CENTER

James Joseph Feffer, B.A., M.D., *Vice President for Medical Affairs*

OFFICE OF ACADEMIC AFFAIRS

The Office of Academic Affairs bears the responsibility for the curriculum; student affairs, including scholarship and financial aid; research and sponsored programs; allied health programs; educational evaluation; admissions; and support services of the library and audio-visual and animal facilities.

John Patrick Naughton, B.S., M.D., *Dean for Academic Affairs*
Lawrence Thompson Bowles, M.D., Ph.D., *Associate Dean for Curricular and Student Affairs*
Fred Leonard, Ph.D., *Associate Dean for Research*
Michael McCally, M.D., Ph.D., *Associate Dean for Allied Health Programs*
Robert Keimowitz, M.S., M.D., *Assistant Dean for Admissions and Director of Admissions (M.D. Program)*
Winfield Harker Scott, Ph.D., *Assistant Dean for Education and Director of Education*

OFFICE OF ADMINISTRATIVE AFFAIRS

The Office of Administrative Affairs is responsible for the administration of the University Hospital and Clinic, for support services to the School of Medicine and Health Sciences, and for the financial management of the Medical Center.

Philip Stanley Birnbaum, M.S. in M.E., B.C.E., *Dean for Administrative Affairs*

OFFICE OF CLINICAL AFFAIRS

The Office of Clinical Affairs is responsible for the patient care activities of the University Hospital and Clinic and for the supervision of the graduate and continuing medical education programs and community affiliation programs.

Ronald Paul Kaufman, B.S., M.D., *Dean for Clinical Affairs and Medical Director of the University Hospital*
Dennis Sophian O'Leary, B.A., M.D., *Associate Dean for Professional Services*
Margaret Gallagher, B.S.N., M.A., *Assistant Dean for Nursing Services and Director of Nursing*

HISTORY

The School of Medicine and Health Sciences of George Washington University has a distinguished history that goes back more than a century. In March 1825, the School opened with the intention of building "a medical school commensurate with the progress and demands of a rising metropolis, and the improvement of service throughout the country." The School, the eleventh oldest medical school in the country, has met this responsibility by providing its students with a foundation in the medical sciences upon which they have built medical careers in practice, teaching, research, or administration.

In 1844, the School took on a new dimension when Congress granted it the use of the Washington Infirmary. Thus one of the earliest general teaching hospitals in the Nation was established in Washington.

The distinguished history of the George Washington University School of Medicine and Health Sciences closely parallels academic advances and medical progress of the Nation. The School has contributed to both.

The George Washington University Medical Center, established in 1966, consists of Walter G. Ross Hall, which houses the School of Medicine and Health Sciences; the Paul Himmelfarb Health Sciences Library; the University Hospital; the H.B. Burns Memorial Building, which houses the University Clinic; the Helen L. and Mary E. Warwick Memorial Building; and affiliated hospitals.

In 1973, with the introduction of undergraduate programs in Allied Health Sciences, the name of the School was officially changed from the School of Medicine to the School of Medicine and Health Sciences.



Physicians and students discuss patient care at a nursing station in the Hospital after making rounds.

The Doctor of Medicine Degree Program

ADMISSION

THE GEORGE WASHINGTON UNIVERSITY School of Medicine and Health Sciences seeks to enroll intellectually gifted, humanly sensitive, mature persons who will excel in the science and art of medicine. Applicants of diverse social and educational backgrounds have access to the admissions process. In the selection process there is no discrimination because of sex, race, color, religion, or national or regional origin.

ENTRANCE REQUIREMENTS

ADMISSION TO THE FIRST-YEAR CLASS

For admission to the Doctor of Medicine degree program, a minimum of 90 semester hours must have been earned in an accredited institution of higher learning. Credits earned in a professional school can be applied to the fulfillment of this minimum requirement only if they are acceptable by the applicant's college or university toward a Bachelor's degree in Arts or Science. (A credit under the quarter system is two-thirds of a semester hour.) It is advantageous to complete four full years of undergraduate study. Only exceptional students are accepted upon completion of the minimal requirements.

It is possible for exceptional students with three years of undergraduate work in Columbian College of George Washington University to be admitted to this medical school and to receive a combined Bachelor of Arts-Doctor of Medicine degree. More detailed information on this program is given on page 15.

The following courses must be completed with satisfactory achievement before the applicant can be certified for matriculation. All required science courses must include sufficient laboratory work to give assurance of familiarity with the experimental methods and techniques of the disciplines.

1. **Biology:** 8 semester hours, including 4 hours of laboratory. This may be either in general biology or zoology but may *not* include separately credited courses in botany.
2. **Chemistry:** 8 semester hours of general inorganic chemistry (which may include qualitative analysis), including 4 semester hours of laboratory; and 6 to 8 semester hours of organic chemistry, including laboratory.
3. **Physics:** 8 semester hours, including at least 2 semester hours of laboratory.
4. **English:** 6 semester hours in composition and literature. This may be the usual introductory college course or its equivalent.

The number of required courses has been kept to a minimum in order to allow college students the time to pursue their own interests in depth. The Admissions Committee has no preference with regard to the major area of study of the applicant. Students with backgrounds in the arts, humanities, and social sciences are as admissable as applicants with science backgrounds. The Committee does expect that work in the student's chosen area of concentration as well as in the required science courses should reflect his scholarly interests and show evidence of significant achievement.

ADMISSION WITH ADVANCED STANDING

The applicant for admission with advanced standing should understand that

very few spaces are available for transfer students because of recent substantial increases in the size of the first- and second-year classes. Transfers into the second year are considered only in exceptional circumstances. Positions in the third-year class, when available, will be offered to students transferring from American medical schools or to American citizens attending foreign medical schools.

The applicant for advanced standing must fulfill the following requirements:

1. The applicant must be or have been a regularly registered student in a school of medicine which is a member or an affiliate member of the Association of American Medical Colleges. Citizens of the United States in foreign medical schools, other than those in Canada, should participate in the COTRANS program sponsored by the Association of American Medical Colleges. Information on this program may be obtained from the Association at One Dupont Circle, N.W., Washington, D.C. 20036.

2. The applicant must be in good standing and eligible to continue in the school where he or she is currently enrolled, or must be eligible to re-enter that school if his education has been interrupted.

3. The applicant must have completed a course of study at least equivalent to that required for advancement to the year for which he is applying had he been a student in the George Washington School of Medicine and Health Sciences. For admission to the second year, he must have completed all work in anatomy, biochemistry, microbiology, and physiology. For admission to the third year, he must have finished all work in these subjects, as well as all work in pathology and pharmacology; must have completed didactic courses in medicine, surgery, obstetrics and gynecology, pediatrics, and psychiatry; and also must have had practical experience in the clinical evaluation of the patient, including physical diagnosis and laboratory medicine.

4. The applicant must have the endorsement of the Dean of his school of medicine or his authorized delegate.

5. The applicant must take the Part I Examination of the National Board of Medical Examiners if he is applying for admission to the third year. He should plan to take the examination in June of the year in which he wishes to enter. Citizens of the United States attending foreign medical schools, other than those in Canada, are required to pass all subjects of the Part I Examination in order to demonstrate competence in the basic sciences. For admission to the second year, citizens of the United States attending foreign medical schools, other than those in Canada, must pass the National Board Examinations in anatomy, biochemistry, microbiology, and physiology.

APPLICATION PROCEDURE

ADMISSION TO THE FIRST-YEAR CLASS

The George Washington University School of Medicine and Health Sciences is a participant in the American Medical College Application Service (AMCAS). Applications for a place in the first-year class can be obtained only from AMCAS, 1776 Massachusetts Avenue, N.W., Suite 301, Washington, D.C. 20036. When completed, this application is returned to AMCAS for distribution to schools selected by the applicant.

After receipt of our copy of the AMCAS application, the Office of Admissions will send applicants a Supplemental Application. This requests informa-

tion not included on the AMCAS application. Submission of this supplemental application, including the nonrefundable supplemental application fee ($25), will initiate Admissions Committee processing of the application. On the basis of the available information some applicants will be asked to have letters of recommendation and official transcripts sent. After careful review of these documents the Committee will extend an invitation for interview to the most promising candidates. When these steps are completed, the application will be brought to the Admissions Committee for final decision. Applicants will be informed of final decisions immediately. Although the School of Medicine and Health Sciences does not assume an obligation to report missing or erroneous credentials, the Admissions Office will try to contact the applicant if it is noted that necessary credentials are missing.

This institution also participates in the AMCAS Early Decision Program. Interested applicants for the 1975-76 entering class are referred to the AMCAS "Information Booklet" included with the AMCAS application materials. Early decision applicants should be aware that they must submit their application by September, 1974, and that for consideration, the supplemental application and all letters of recommendation and transcripts must be received by the Office of Admissions no later than September 16, 1974. Decisions on early decision candidates are made usually by October 2 and no later than October 17, 1974.

Applicants are referred to the AMCAS "Information Booklet for the 1975-76 Entering Class" for the most up-to-date information available at the time of application. Details included in that booklet supersede information contained herein.

ADMISSION WITH ADVANCED STANDING

Applications for admission with advanced standing should be obtained from the Office of Admissions (M.D. Program), School of Medicine and Health Sciences, 2300 Eye Street, N.W., Washington, D.C. 20037.

The application, the nonrefundable application fee of $25, and all supporting credentials must be received by the Office of Admissions no later than April 15. Supporting credentials include transcripts from each institution attended since high school (including certified originals with translations of foreign medical school records), letters of recommendation, including the Dean's letter, and Medical College Admission Test scores. Applicants applying through COTRANS must meet the April 15 deadline, although the Office of Admissions will wait until the National Board scores are available in June or July before making final decisions.

The most recent application information will be made available at the time an applicant requests his application. That information will supersede information contained herein.

SELECTION PROCEDURES

In order to process the vast number of applications to this institution fairly and expeditiously, a screening evaluation system is utilized. This evaluation procedure screens applicants on the basis of undergraduate grades (taking into account improvement in performance in later years), Medical College Admission Test scores, and pertinent extracurricular and work experiences. Some additional consideration is given to applicants from the District of Columbia and

the neighboring metropolitan area, as well as to applicants from George Washington University. Although there are no age limits, the very young and relatively older applicants must demonstrate considerable strength in other aspects of their applications.

When all credentials and interview reports are available, the application is reviewed by the entire Admissions Committee. In this review, although grades and MCAT scores are considered, major consideration is given to the essay portions of the applications, the letters of recommendation, and the interview reports, in an attempt to assess those motivational and personal characteristics that the Committee feels are so important in choosing future physicians.

An applicant who is offered a place in the class is required, within two weeks, to notify the Office of Admissions (M.D. Program) of the School of Medicine and Health Sciences in writing of his intent to accept the place reserved for him. A deposit of $100 is also required by a specific date after notification of acceptance. The date will be given in the notice of acceptance. The deposit will not be refunded after registration but will be credited toward the tuition of the first semester.

PROGRAM OF STUDY

The faculty and administration of the School of Medicine and Health Sciences have developed a curriculum designed to prepare each student for a professional life of continuous learning. Because students differ in background, ability, and career interests, the curriculum is balanced with required courses, and each student is encouraged to maximal achievement within his or her own limits. It is presumed that all graduates will seek additional education in graduate training programs before assuming complete responsibility for independent clinical decision-making.

In the first year, the student concentrates primarily on basic sciences, beginning with an orientation in cell biology taught by members of all basic science departments. The remainder of the first semester includes anatomy and biochemistry and finishes with an introduction to neurobiology which bridges the



Instruction in the gross anatomy laboratory is an important introduction to the medical profession.

one-month vacation in December–January to the second semester. In the second semester, the student concentrates on physiology and microbiology in addition to the integrated course in neurobiology.

The second year provides time blocks for both pharmacology and pathology; however, much of the year is interdigitated in an introduction to the clinical sciences, which is conducted cooperatively by members of the basic science and clinical science departments.

A two-year continuum of required clerkships and elective sequences designed to bring the student to optimal readiness for graduate training begins in the third year. Clerkships are required in medicine, surgery, pediatrics, obstetrics-gynecology, and psychiatry. A great variety of elective experience is available at George Washington and its affiliated hospitals, and permission may be obtained to take electives away from the George Washington campus.

During the entire educational experience, students are encouraged to assume responsibility for their self-assessment and continued learning. It is the goal of the faculty to select and educate concerned human beings who will function productively and effectively for a long career in medicine.

DEGREE REQUIREMENTS

Every candidate for graduation with the degree of Doctor of Medicine must have satisfactorily completed the requirements of the School of Medicine and Health Sciences as described on pages 14–15, including no less than four academic years of study as a matriculated student in medicine. All required courses must be completed and all prescribed examinations satisfactorily passed.

HONORS

A candidate who has completed the four-year course for the Doctor of Medicine degree and has received the grade of *H* (Honors) in courses totalling 50 per cent or more of the total number of semester hours he has taken may be recommended by the Executive Committee of the Medical Center for graduation "With Distinction."

COMBINED DEGREE PROGRAMS

COMBINED BACHELOR OF ARTS AND DOCTOR OF MEDICINE

In cooperation with Columbian College of Arts and Sciences, a seven-year curriculum leading to the combined degrees of Bachelor of Arts and Doctor of Medicine is offered.

In order to be recommended for the degree of Bachelor of Arts, the candidate must complete at least 94 semester hours of prescribed college work (at least 30 hours and one year of residence must be completed in Columbian College of Arts and Sciences) and the first year of the medical curriculum. Upon satisfactory completion of the fourth year of the medical curriculum the student becomes eligible for the degree of Doctor of Medicine.

COMBINED MASTER OF SCIENCE AND DOCTOR OF MEDICINE

The departments of the School of Medicine and Health Sciences cooperate with the Graduate School of Arts and Sciences in offering programs leading to the combined degrees of Master of Science and Doctor of Medicine in the fields of anatomic pathology, biochemistry, genetics, microbiology, mycology, pharmacology, and physiology.

Students in the School of Medicine and Health Sciences who wish to apply for the combined degrees of Master of Science and Doctor of Medicine must meet the requirements for admission to the Graduate School of Arts and Sciences. They must be recommended by the chairman of the department and by the Dean of the Graduate School of Arts and Sciences and the Dean for Academic Affairs of the Medical Center.

The Master of Science degree program consists of a minimum of 30 semester hours which includes a thesis (equivalent to 6 semester hours). For a Master of Science degree program which does *not* include a thesis, the number of semester hours of graduate course work is determined by the department. The program without the thesis is not an individual student option and is not available in every department.

A maximum of 12 semester hours of credit for graduate-level courses *completed as a part of the Doctor of Medicine degree* (and not already applied toward the Bachelor's degree) will be allowed in fulfillment of the requirements of the Master of Science degree. The remaining semester hours of work, including a thesis if it is required, must be in course work in the basic medical sciences normally required for a Master of Science degree in the Graduate School of Arts and Sciences.

DUAL PROGRAM FOR THE DOCTOR OF MEDICINE AND DOCTOR OF PHILOSOPHY DEGREES

In cooperation with the Graduate School of Arts and Sciences a dual program is available to qualified students who seek both the Doctor of Medicine and Doctor of Philosophy degrees. The requirements which must be fulfilled for both degrees are identical to those currently and separately established in the School of Medicine and Health Sciences and the Graduate School of Arts and Sciences.

In order to enter the dual degree program, a prospective student first must apply for and gain admission to both the Graduate School of Arts and Sciences and the School of Medicine and Health Sciences separately through established procedures. Upon admission to both schools, he may then apply for affiliation with the dual degree program. Work toward the Doctor of Philosophy degree is performed under the jurisdiction of a *departmental* Doctoral Committee and is available in more than fifty research fields.

A student working toward these degrees may apply a maximum of 24 semester hours of approved work taken in the M.D. degree program of the School of Medicine and Health Sciences toward the total of 72 semester hours required to complete the requirements for the Doctor of Philosophy degree. Twenty-four hours of this requirement must be earned in graduate courses during periods when the student is not obligated to full-time enrollment in the M.D. degree program, i.e., during summer sessions, vacation periods, etc. The final 24 semester hours of dissertation research toward the Doctor of Philoso-

phy degree may begin concurrently with the final semester of graduate course work. The estimated expected time for completion of this dual program is 6 years.

MASTER OF SCIENCE AND DOCTOR OF PHILOSOPHY REQUIREMENTS

The detailed requirements for the degrees of Master of Science and Doctor of Philosophy are stated in the *Undergraduate and Graduate Catalogue* of the University, which is available at the Graduate School of Arts and Sciences, George Washington University, Washington, D.C. 20006.

REGISTRATION

Registration for the 1974–75 fall semester will be conducted from 10 a.m. to 2 p.m., on September 3. The place of registration for the fall semester as well as the time and place of registration for the spring semester and the summer session of fourth-year clerkships will be announced in the *Schedule of Classes*.

FEES AND FINANCIAL REGULATIONS

The following fees have been established for the academic year 1974–75. (See pages 18–19 for projected tuition and fee increases for 1975–79.)

Application fee	$25.00
Tuition fee, for the academic year	3,200.00
University Center fee, charged all students (except those granted "leave of absence" status) each semester	43.00
Late registration fee, for failure to register within the designated period	15.00
Late payment fee, charged for failure to make payments when due (see "Payment of Fees," below)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," below)	35.00
Continuous Registration fee, charged each student granted "leave of absence" status for each semester in the School of Medicine and Health Sciences	90.00
University Center fee, charged each student granted "leave of absence" status, each semester	4.00
Graduation fee	25.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds	15.00

PAYMENT OF FEES

The annual fee of $3,200 for the 1974–75 academic year is payable at the rate of $1,600 on or before registration day for each semester. Students registered for the summer session of fourth-year clerkships will be on "continuous registration" without charge until the following fall semester. No student is per-

mitted to complete registration or attend classes until all charges are paid. Tuition and fees are payable at the Office of the Cashier of the University. Checks and postal money orders should be made payable to George Washington University, with student identification number shown in upper left-hand corner.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. While tuition is due and payable in full as described above, a student may sign a deferred payment contract with the Student Accounts Office at the time of registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 23, 1974 (for the fall semester), and March 5, 1975 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made. The University will not obligate itself to notify the student, in advance, of the payment-due date for the second half of the semester charge.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $525 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his rights to the use of the deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

After a student has entered the course of instruction he is obligated for the tuition for the full semester. A student registered for the clerkships of the summer session is obligated for tuition due at the time of registration for the following fall semester, except that in the case of withdrawal or leave of absence a *pro rata* payment will become due immediately.

Acceptance by the University of a student's fees does not in any way obligate the School of Medicine and Health Sciences to accept the student for any subsequent semester or summer session, and the right is reserved to require the withdrawal of any student whenever, in the interest of the student or the School, the Executive Committee of the Medical Center deems it advisable to do so.

PROJECTED TUITION AND FEE INCREASES FOR 1975–79

Academic year tuition increases have been estimated as follows: 1975–76, $200; 1976–77, $200; 1977–78, $200; 1978–79, $200. Beginning with the 1975 summer sessions, the University Center Fee charged each student granted "leave of absence" status will be $4.35, an increase of $0.35; beginning with the academic year 1975–76, the University Center Fee will be $46.50 a se-

mester, an increase of $3.50. Every effort will be made to keep tuition increases within these limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment in this estimate.

COST OF TEXTBOOKS AND STUDENT EQUIPMENT

The minimum cost of necessary textbooks and student equipment (microscope, drawing materials, glass slides, clinical thermometer, stethoscope, hemocytometer, uniforms, etc.) is approximately as follows: first year, $700; second year, $400; third year, $200; and fourth year, $200. Microscopes must be provided by the student. Rentals are not available.

PREPAID AND DEFERRED PAYMENT PLANS FOR PARENTS

Several commercial programs for parents who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

FINANCIAL AID

The following fellowships, scholarships, and loan funds are available to students in the School of Medicine and Health Sciences. Unless otherwise specified, inquiries should be directed to the Office of the Dean for Academic Affairs of the Medical Center, George Washington University, 2300 Eye Street, N.W., Washington, D.C. 20037.

FELLOWSHIPS

Wilbur J. and Edith K. Carr Memorial Fellowship Fund (1965).—By bequest of Edith K. Carr, former Trustee of the University. The income from this fund provides fellowships in surgery, medicine, or medical research at the George Washington University Hospital.

Samuel Jordan Graham Fellowship in Surgery (1961).—By bequest, in memory of Judge and Mrs. Graham. The income from this fund, up to $2,000, may be used to assist students who are pursuing postgraduate study or research, preferably in surgery, at the School of Medicine and Health Sciences. If no individual is conducting such work or deserving of the award, the income may be used to provide one or more scholarships (to cover tuition and other school expenses deemed appropriate) for students in the School of Med-

icine and Health Sciences. Application should be filed with the Chairman o the Department of Surgery no later than March 1.

Robin Miller Research Fellowship (1953).—A $3,000 fellowship establishe by bequest of Mrs. Robin Miller for the study of cardiovascular diseases.

Henry Rau Foundation Student Fellowship Grant (1967).—Awarded an nually to a student in the School of Medicine and Health Sciences for researc in cancer and allied diseases at the George Washington University Clinic.

U.S. Public Health Service Training Grants.—Information concerning train ing grants in fields of the medical sciences is available at the Office of the Dea for Academic Affairs of the Medical Center.

SCHOLARSHIPS

Scholarships awarded to students in the M.D. degree program are credited for the academic year unless otherwise specified. Each holder must carry a full schedule of academic work during the period for which the scholarship is awarded. Applicants should apply on prescribed forms which must be filed in the Office of the Dean for Academic Affairs of the Medical Center no later than March 15 preceding the academic year for which the scholarship is to be awarded.

Achievement Rewards for College Scientists (ARCS) Foundation, Inc. Scholarship.—Awarded to a student on the basis of financial need and superior grades. Candidates must be citizens of the United States.

Armed Forces Health Professions Scholarship Program (1972).—Available to members of the armed forces who qualify under Public Law 92–426. Interested individuals should write to one of the following: (1) Department of the Army, DASG-PTP, Washington, D.C. 20314; (2) Bureau of Medicine and Surgery, Navy Department (Code 3174), Washington, D.C. 20372; (3) ATC RSOS, Randolph Air Force Base, Texas 78148.

Anna Bartsch Hospital Intern Scholarship (1946).—A partial scholarship established by Dr. Anna Bartsch-Dunne as a memorial to her mother. Awarded to a woman intern in the University Hospital.

Anna Bartsch Medical Student Scholarship (1946).—A partial scholarship established by Dr. Anna Bartsch-Dunne as a memorial to her mother. Awarded to a woman in the School of Medicine and Health Sciences "of outstanding scholarship, character, and promise, who intends to make the practice of medicine her life profession."

Jack I. Bender Scholarship (1967).—A partial scholarship established by the family of Jack I. Bender as a memorial to their father. Awarded annually to a student on the basis of academic performance and need.

Everett Lamont Bradley Scholarship (1954).—A partial scholarship, by bequest of Alice R. H. Bradley in memory of her son, for a student in the School of Medicine and Health Sciences.

Dr. Edith SeVille Coale Scholarships (1965).—Provided at the request of Dr. Coale for women in the School of Medicine and Health Sciences. The scholarships are administered by the Zonta Club of Washington. Application should be made to the Office of the Dean for Academic Affairs of the Medical Center no later than December 1.

Joseph Collins Foundation Scholarships (1951).—Available to medical students upon application through the Office of the Dean for Academic Affairs of the Medical Center.

Oliver C. Cox Scholarship Fund (1973).—Established in memory of Oliver

C. Cox, M.D., "for the establishment, support, and maintenance of endowed scholarships in medicine."

Health Professions Scholarship Program (1966).—Awarded by the School of Medicine and Health Sciences to students who qualify under the provisions of Public Law 89–920. Inquiries should be directed to the Associate Dean for Curricular and Student Affairs.

Joan Luria Hines Scholarship (1968).—Established by friends, students, and faculty of the School of Medicine and Health Sciences as a memorial to the wife of a medical student.

Ki-Wives of Washington Scholarship Fund (1958).—Three tuition scholarships available to students in the School of Medicine and Health Sciences.

Sidney A. Levine Scholarship Fund (1971).—Established to assist medical students on the basis of need and academic performance.

Medical Student Research Scholarships and Traineeships.—For student participation in the research programs of the School of Medicine and Health Sciences or special training in research methods. Research scholarships are ordinarily awarded for full-time activity during the summer months; research traineeships support part-time work during the academic year. Scholars are "matched" with members of the faculty in accordance with their mutual interests. Trainees are designated by the departments responsible for the programs. These programs have been sponsored by the National Institutes of Health. In addition a number of research scholarships have been made available through the Washington Heart Association.

Chas. Pfizer Medical Scholarship Program (1962).—Established to financially assist a student in the School of Medicine and Health Sciences.

School of Medicine Scholarship Fund (1948).—Established by gifts of various donors for tuition awards in the School of Medicine and Health Sciences.

David Perry Steinman Memorial Scholarship Fund (1960).—Established by friends and classmates. Awarded annually to a second-year student in the School of Medicine and Health Sciences on the basis of need and academic performance.

James J. Whisman Scholarship (1966).—A partial scholarship by bequest of James J. Whisman for needy and deserving students in the School of Medicine and Health Sciences.

COLUMBIAN WOMEN SCHOLARSHIP FUNDS

The Columbian Women Scholarships are awarded to women students on the basis of financial need and scholastic attainment. Candidates must have completed a minimum of 15 hours at this University with a minimum *B* (3.0) average, or the equivalent. A letter of application for these scholarships should be addressed to the Chairman, Columbian Women Scholarships, care of the Alumni Office, George Washington University, Washington, D.C. 20006, no later than May 15 for the fall semester, and January 1 for the spring semester. Scholarship aid is awarded from income of the following endowments:

Estelle M. Corbett Scholarship Fund (1973).—A fund of $1,000 for tuition aid.

Jessie Fant Evans Scholarship Fund (1967).—A $10,135 fund for tuition aid, established by bequest of Jessie Fant Evans, former Trustee of the University.

Lewes D. and Myrtie H. Wilson Memorial Scholarship Fund (1926).—A fund of $1,000 for tuition aid, established by Elizabeth Wilson as a memorial to her parents.

LOAN FUNDS

American Medical Association Medical Education Loan Guarantee Program (1960).—Available to medical school students (beyond the first semester of the M.D. degree program).

Catherine Breen Student Loan Fund (1972).—Established by alumni of the School of Medicine and Health Sciences in honor of Miss Catherine Breen, former Assistant to the Dean of the Medical Center. Available to needy students who are candidates for the degree of Doctor of Medicine. Application should be made to The George Washington University Medical Alumni Association.

Edith K. Carr Medical School Loan Fund (1962).—Established by Mrs. Carr for loans to students in the School of Medicine and Health Sciences.

Health Professions Student Loan Program.—This fund is available to a full-time student pursuing a course of study leading to the degree of Doctor of Medicine. Interns, residents, students engaged in premedical or other professional training, and students enrolled in programs of study other than those leading to the degree mentioned above are *not* eligible for these loans.

A candidate must (1) be a citizen of the United States or have such immigration status and personal plans as to indicate that he intends to become a permanent resident of the United States, (2) be in need of the amount of the loan to be able to pursue his course of study, and (3) be in good standing with the School. Inquiries concerning deadlines and applications should be directed to the Associate Dean for Curricular and Student Affairs.

Joseph H. Himes Loan Fund (1956).—Available for loans to students in the School of Medicine and Health Sciences.

Robert Wood Johnson Foundation Loan Fund (1972).—Available to medical students who are women, members of designated minority groups, or legal residents of counties of less than 50,000 population, and who are citizens of the United States.

W.K. Kellogg Medical School Loan Fund (1942).—Established by W.K. Kellogg Foundation in Battle Creek, Michigan.

Jessie B. Martin Loan Fund (1967).—Established by friends of Mrs. Jessie B. Martin, former Editor of Academic Publications at the University. An emergency fund for loans up to $250, payable prior to ceasing of enrollment, with interest rate of 3 per cent per annum. Application should be made to the Director of the Office of Student Financial Aid.

Pfizer Medical School Loan Fund (1953).—Established by Chas. Pfizer & Co., Inc.

School of Medicine and Health Sciences Loan Fund (1951).—A fund established by medical students and augmented by bequest from the estate of Ethel L. Murray.

Sutherland Medical School Loan Fund (1941).—Established by Rose L. Sutherland.

W.E. Wrather Medical Student Loan Fund (1967).—Established by gift of Mrs. Alice D. Wrather in memory of her husband.

PRIZES

American Medical Women's Association, Inc., Prize.—A certificate awarded annually to each woman ranking academically in the upper 10 per cent of the

graduating class. An additional prize of $100 is awarded to a woman who has the highest scholastic ranking in her graduating class.

Samuel M. and Miriam S. Dodek Prize (1967).—Established in memory of Professor Bernhard Zondek, the eminent discoverer of the endocrinology of the human female reproductive cycle. Awarded annually to a member of the graduating class who has attained a commendable knowledge and understanding of the field of female endocrinology.

Allie S. Freed Prize (1957).—Awarded annually to a member of the graduating class who has demonstrated exceptional proficiency in the field of preventive medicine.

Walter Freeman Prize (1966).—Awarded annually to a student in the graduating class who submits the best essay based on original investigation.

Alec Horwitz Prize (1959).—A prize of $100 awarded annually to a senior who has demonstrated exceptional proficiency in the field of surgery.

Oscar Benwood Hunter Prize (1952).—Established by The George Washington University Medical Society, now known as The George Washington University Medical Alumni Association. Awarded annually to a member of the graduating class who has demonstrated outstanding ability in pathology.

Jacobi Medical Society Prize (1962).—Established in memory of Dr. Abraham Jacobi, the founder of pediatrics practice in the United States. Awarded annually to a member of the graduating class who has demonstrated outstanding ability in pediatrics.

Howard Kane-A.F.A. King Obstetrical Society Prize (1937).—Established in memory of Dr. Howard Kane and Dr. A.F.A. King, who served as Professors in the School of Medicine. Awarded annually to a member of the graduating class who has demonstrated outstanding ability in obstetrics and gynecology.

Lange Medical Publications Prize.—Awarded annually to two members of the graduating class who are considered outstanding by their classmates. The prize consists of the graduate's choice of four books published by Lange Medical Publications.

Huron W. Lawson Prize (1957).—A prize of $100 established by Mrs. Lawson in memory of her husband, who was a distinguished member of the Medical Staff of the University, presented annually to a member of the graduating class who has demonstrated exceptional proficiency in the field of obstetrics and gynecology.

Benjamin Manchester Prize (1966).—Established by a grateful patient in honor of Doctor Benjamin Manchester, Clinical Professor of Medicine. Awarded annually to a member of the graduating class who has an outstanding record and shows promise of real humanitarianism in the practice of medicine.

C.V. Mosby Book Prize.—Awarded annually to four members of the graduating class who are considered outstanding by their classmates. The prize consists of the graduate's choice of a book published by C.V. Mosby Company.

Julius S. Neviaser Prize in Orthopaedic Surgery (1956).—A prize of $100 awarded annually to the senior who scores the highest grade in a written examination and clinical aspects of orthopaedic surgery.

John Ordronaux Prize (1907).—By bequest, $150 awarded annually to the member of the graduating class who has the highest scholastic standing.

Roche Prize.—An Omega watch and a scroll awarded annually to the mem-

ber of the graduating class who best exemplifies the ideals of the modern American physician. The winner is chosen by vote of the graduating class.

William G. Schafhirt Prize (1966).—By bequest, $200 awarded annually to a senior student for the best original essay or thesis on some medical subject of current public interest.

Upjohn Achievement Prize.—A prize of $200 and an inscribed plaque awarded annually to a member of the graduating class selected by his or her classmates on the basis of outstanding scholastic and personal achievement.

HONOR SOCIETIES

Alpha Omega Alpha.—National Honor Medical Society. Third- and fourth-year candidates for the M.D. degree meeting the qualifications specified by the constitution of the Society are eligible for election to membership.

William Beaumont Medical Society.—Medical students showing unusual ability for medical writing and research are elected by the active members of this society.

Howard Kane-A.F.A. King Obstetrical Society.—The fifteen third- and fourth-year candidates for the M.D. degree who maintain the highest grades in their work in obstetrics are eligible for membership.

Smith-Reed-Russell Society.—M.D. degree candidates of the third and fourth years who have received the grade of *H* (Honors) in courses totalling 40 per cent or more of their total semester hours are eligible for membership.

MEDICAL ETHICS FORUM

The Medical Ethics Forum is a student-founded organization which sponsors an informal series of seminars. Speakers are invited to discuss current ethical questions with which students and doctors are confronted in medical practice and research. In addition, the Forum sponsors symposia to evaluate more thoroughly particularly seminal issues.



Any corner of the George Washington University Hospital can become the setting for a corridor conference.

REGULATIONS

ATTENDANCE

A student is not permitted to attend classes until registration has been completed and fees due have been paid. Regular attendance is required.

GRADES

H—Honors; *P*—Pass; *F*—Failure; *IP*—In Progress; *I*—Incomplete; *W*—Withdraw.

Those students whose performances in a subject, as determined by the department concerned, are of a very high caliber, and who, in addition, have demonstrated those qualities of intellectual curiosity, integrity, and self-discipline which clearly set them apart from the majority of the group, may be assigned the grade of *H* (Honors).

The grade of *P* (Pass) will be assigned to all students who meet the minimum standards of performance in a subject as determined by the department concerned, unless they are entitled to the grade of *H* (Honors).

The grade of *F* (Failure) will be assigned when a student fails to meet the minimum standards of performance in a subject as determined by the department concerned. A student receiving the grade of *F* in any subject may not advance to the work of the following year until he has complied with such recommendations of the Committee on Educational Evaluation as are approved by the Executive Committee of the Medical Center.

The grade of *IP* (In Progress) will be assigned to students in courses which require more than one semester for completion. A single definitive grade will be assigned upon completion of the entire course in a subsequent semester.

The grade of *I* (Incomplete) will be assigned when a student fails to complete all the required work in a course for reasons acceptable to the Associate Dean for Curricular and Student Affairs. A student in the first and second years may not proceed into the work of the following year until a grade of *I* has been removed; if not removed, a grade of *I* will be automatically changed to a grade of *F* (Failure) after one year. A student in the third or fourth years must remove a grade of *I* prior to graduation.

The grade of *W* (Withdraw) will be assigned only when a student is unable to continue in school for reasons acceptable to the Associate Dean for Curricular and Student Affairs (such reasons may *not* include poor scholarship). Such a student may be readmitted, at the discretion of the Associate Dean for Curricular and Student Affairs, within a period of two years, and he may repeat for credit the course or courses in which he had been assigned the grade of *W*.

AUDITING

Students may, with the permission of the instructor, register as an "auditor" in a class (no academic credit). An auditor is not required to take active part or to pass examinations. A student who takes a course as an auditor may not later repeat it for credit.

PROBATION

A student who receives grades of *F* in courses totalling 6 or more semester

hours in one semester will be placed on academic probation for the following semester. A student who while on probation receives a grade of *F* in any course will be continued on probation for the following semester.

ACADEMIC DISMISSAL

A student (1) who exceeds three semesters, consecutive or otherwise, on probation; or (2) who receives grades of *F* in courses totalling 14 or more semester hours in any academic year; or (3) who receives grades of *F* in courses totalling more than 20 semester hours of work in the M.D. degree program; or (4) whose academic achievement is otherwise considered unsatisfactory by the Educational Evaluation Committee will not be allowed to continue in the M.D. degree program.

EXAMINATIONS

Examinations, which may be written, oral, or practical, will be held during and/or at the end of each semester.

All candidates for the M.D. degree are required to take the Part I and Part II examinations of the National Board of Medical Examiners.

ACADEMIC DISHONESTY

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the Executive Committee of the Medical Center, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the Executive Committee of the Medical Center, the disciplinary grade of "Failure—Academic Dishonesty" will be recorded for the course involved. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

GRADUATION

Application for Graduation.—Application for graduation must be filed in the Office of the Dean for Academic Affairs, and the fee must be paid at the time of registration for the last semester of the fourth year.

Presence at Graduation.—A candidate is required to be present at the graduation exercises unless written application for graduation *in absentia* is approved by the Dean for Academic Affairs.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 251–53) contains regulations recently approved by the University's Board of Trustees.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's records confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; dates of attendance; verification of date and place of birth; degrees earned (if any), date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.
2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.)

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.



Medical students practice with casts and bandages.



Student/computer communications in the Office of Computer-assisted Education.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1, above.

STUDENT HEALTH SERVICE

The Student Health Service is a general outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the academic year from 9 a.m. to 5 p.m. and from 6 p.m. to 10 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. This schedule is also maintained during the Summer Sessions except that the evening closing hour Monday through Friday is 9 p.m.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed his connection with the University is ineligible for medical benefits of the Student Health Service. Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, X-ray work and referrals to specialists or other outside physicians) are the responsibility of the student. Within the Student Health Service, there will be only a few small charges for some services, such as materials for an allergy injection series, overseas immunizations, and certain other services.

Any student who intends to train for an athletic team is required to pass a thorough medical examination. The University is not responsible for injuries received in intercollegiate or intramural games, or in any of the activities of the Department of Physical Education, Health, and Recreation.

HEALTH AND ACCIDENT INSURANCE

The Student Health Service has arranged for and endorsed group health and accident insurance, on an elective basis, for those full-time students who do not have other coverage. Interested students should contact the Student Health Service Office.

PHYSICAL EXAMINATIONS

All first-year students are required to have a comprehensive physical examination prior to admission to the M.D. degree program in the School of Medicine and Health Sciences. The students are informed of significant findings and advised regarding such measures as will tend to help them maintain a high standard of health.

In addition medical students benefit from the complete Tuberculosis Case Finding Program which the School maintains. Under this program all students

receive tuberculin tests, X-ray examinations, and such special attention from chest specialists as is necessary to reduce to a minimum the dangers from tuberculosis. Students are immunized against those diseases for which proven prophylaxis exists.

RESIDENCE HALLS

Complete information concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20006. Information concerning off-campus housing may be obtained at this Office and at the Office of the Dean for Academic Affairs. Reservations for private housing must be made by students.

Undergraduate Programs in Allied Health Sciences

PROGRAMS OF STUDY in the allied health sciences at the School of Medicine and Health Sciences include those disciplines and skills that are allied to medicine in the delivery of health care and health education. The faculty of the School recognizes that modern medical practice requires increasing numbers of non-physician health care professionals; that such allied health personnel are appropriately educated in an academic health center; and that new roles for health care providers require the introduction of new curricula in allied health and nursing education.

The purpose of the School's allied health program is to meet the health needs of our community and our society by training appropriate manpower, and to meet the needs of the student who has chosen a career in the health sciences area by providing programs that combine effective training leading to professional skill and competence with sound education leading to continued personal and professional development.

Programs in Allied Health Science are currently offered leading to the degrees of (1) Associate in Science, with areas of concentration in Medical Laboratory Technique, Medical Service Technology, Nuclear Medicine Technology, and Radiologic Technology; and (2) Bachelor of Science in the fields of Environmental Health, Medical Technology, and Radiologic Sciences and Administration, or with designation as Physician's Assistant, Nurse Anesthetist, and Nurse Practitioner.

Certificates are also awarded in the Physician's Assistant, Nurse Anesthetist, and Nurse Practitioner programs.

ADMISSION

The right is reserved to refuse admission to any student with an academic record which creates doubt of his ability to succeed in college, or who, for any other reason, would not be an acceptable student. In the selection process, there is no discrimination because of sex, race, color, creed, or national or regional origin.

An application for admission to degree candidacy should be accompanied by a nonrefundable $10 application fee.* The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of his last registration at this University and who has not since registered at another institution.

Applicants should submit the application form and complete credentials by June 1. Some programs may require an earlier admissions date.

All credentials submitted in support of an application are treated confidentially and the contents are disclosed only to authorized individuals. Such credentials become the property of the University and cannot be returned.

Forms for application for admission or readmission are available at, and should be returned to, the Office of Admissions, George Washington University, Washington, D.C. 20006.

ADMISSION TO DEGREE CANDIDACY

The following are required for admission to degree candidacy in all Allied Health programs:

1. Graduates of secondary schools must have a diploma based upon an acceptable academic record from an accredited secondary school. Applicants who have not graduated from secondary school must have satisfactory scores on the General Educational Development (GED) High School Level tests.

2. Students who have completed secondary school within two years of the date of their application for degree candidacy and who have not attended any other college or university must have acceptable scores on the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board (CEEB)†; applicants without previous college work who have completed secondary school more than two years before their date of application may substitute acceptable scores on the College-Level Examination (CLEP) or acceptable scores on the General Educational Development (GED) High School Level test.

3. Students who have completed fewer than 12 semester hours of acceptable course work at an accredited college or university before applying for degree candidacy must have a secondary school record and acceptable scores on one of the three examinations listed in item 2 above.

4. Students who have completed 12 or more semester hours of acceptable course work at an accredited college or university must have maintained an over-all quality-point index of 2.00 in course work; they must be in good standing as to scholarship and conduct and be eligible to return to the last previously attended institution in the same semester for which admission is sought to George Washington University. A student who has been academically dismissed or suspended more than twice is ineligible for consideration for at least five years from the date of his last suspension or dismissal.

REQUIRED CREDENTIALS

1. A transcript of secondary school work, or, for students who are not graduates of secondary schools, scores on the General Educational Development test. Transcripts must be forwarded directly from the institution attended to the

* Application fee must be by check or postal money order, payable to George Washington University.

† The College Entrance Examination Board test is preferred; however, the American College Testing battery scores will be accepted.

Office of Admissions. A transcript submitted by the student himself is not acceptable.

2. For applicants who have attended any college, university, or other institution of higher learning, an official transcript forwarded to the Office of Admissions by each institution attended regardless of whether credit was earned or desired.

3. Scores on standardized examinations (ACT, SAT, CLEP, etc.) forwarded by the administering agency directly to the Office of Admissions.

4. Records from service schools.

ADVANCED TUITION DEPOSIT

Upon notification of acceptance, a $100 advanced tuition deposit will be required of all full-time undergraduate students including those readmitted. The deposit is credited toward tuition and is not refundable.

NONDEGREE STUDENTS

Students who wish to take individual courses in Allied Health programs without applying for degree candidacy must apply for admission to the University's Division of University Students. Complete information on admission to this Division is contained in the University's *Undergraduate and Graduate Catalogue*. The department offering the course shall determine whether admission will be granted to nondegree students. Credits earned as a nondegree student may be transferred to degree programs at the University provided the course(s) are applicable to the desired curriculum and the student meets the requirements of the degree program for which application is made.

ADVANCED STANDING

Advanced standing may be awarded for course work taken at other accredited institutions at the college or university level or for nontraditional classroom or clinical experience. Students are reminded, however, that they must satisfy the residence requirement for their degree program (see pages 39, 42) no matter how much advanced standing may be granted.

It is the responsibility of the student to have certified official transcripts of all course work taken at other institutions or the results of examinations sent by the issuing institution or agency directly to the Office of Admissions, George Washington University, Washington, D.C. 20006. If the applicant has fewer than 30 semester hours of acceptable credit (grades of *C* or better on academic work from an accredited institution) at the time the application is submitted, he must have his secondary school record sent directly to the Office of Admissions from the school.

The University reserves the right to refuse credit for transfer in part or in whole, or to allow it provisionally. Credit so given may be withdrawn for subsequent poor work. No time limitation will be placed on the transfer of credits from other institutions in the areas of human competence (language, humanities, social studies, mathematics) or subject competence (biological sciences, mathematics, or physical sciences which are related to allied health sciences). However, in areas of vocational competence (clinical applications as dictated by individual programs), credit will not be granted for work completed five or

more years prior to application unless proficiency and/or continued maintenance of skills are demonstrated.

CREDIT FROM HIGHER INSTITUTIONS

Unlimited advanced standing may be awarded for appropriate course work completed with a minimum grade of *C* or its equivalent at other accredited institutions of higher learning, provided the course is applicable to or comparable with a course in the required curriculum, or the degree program to which the student has been admitted has provisions for elective credit toward which the credit for advanced standing may be applied. Although a grade of *D* is not acceptable for transfer, a course in which a student has received the grade of *D* may be used to satisfy a curriculum requirement. It may not, however, be counted toward the total number of semester hours required for the degree, and it may not be repeated without the approval of the faculty adviser.

CREDIT FOR NONTRADITIONAL CLASSROOM OR CLINICAL EXPERIENCE

Assuming there is no duplication of course work earned, a maximum of 60 semester hours of advanced standing may be awarded on the basis of nontraditional classroom or clinical experience, by a combination of any of the methods listed below:

Credit from Service Schools.—A maximum of 30 semester hours may be obtained on the basis of work satisfactorily completed in military service schools as evaluated in accordance with the *Guide to the Evaluation of Educational Experiences in the Armed Forces.* No credit will be granted for military experience as such.

Credit through Special Departmental Examinations.—With the approval of the departmental faculty adviser and the department chairmen concerned, permission to take special departmental examinations may be granted to those who are qualified by work experience or background. These examinations may be taken only once, and a satisfactory grade is required for credit to be awarded. A maximum of 30 semester hours of advanced standing may be awarded for these examinations. A fee of $25 for each course examination is charged for preparing, administering, and grading.

Credit for College Entrance Examination Board College-level Examination Program (CLEP).—A maximum of 30 semester hours of advanced standing may be awarded for successful completion of CLEP General and Subject examinations. CLEP Subject Examinations are offered in 29 subject areas. These tests measure achievement in the equivalent of specific college-level courses. (Credit may not be earned by passing the examination after having taken the equivalent course.) CLEP General Examinations are offered in five areas: Mathematics, Social Sciences, Humanities, the Natural Sciences, and English Composition. (Credit—advanced standing—is not given for the General Test in English Composition.) To be eligible to take the CLEP General Examinations, a student must have been out of secondary school for three years or more, and he must not have been enrolled in any regular college program during that time.

Credit for New York State Board of Regent's Examination.—Applicants for degrees who present proper certification of award of a degree at the Associate level from the New York State Board of Regents *may* be awarded a maximum of 60 semester hours of advanced standing.

Credit for Correspondence Courses.—A maximum of 30 semester hours of advanced standing *may* be awarded through the successful completion of appropriate correspondence courses offered by accredited colleges and universities.

Credit through United States Armed Forces Institute (USAFI) Examinations.—A maximum of 30 semester hours of advanced standing may be assigned for approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

Currently registered degree candidates must obtain permission from the Associate Dean for Allied Health Programs before registering to take examinations, correspondence courses, or courses at other accredited institutions.

READMISSION

A student previously registered in the University who was not registered on campus during the immediately preceding semester (summer session excluded), must apply for readmission. If the student applies as a degree candidate and was previously registered as a nondegree student, or if he has attended one or more higher institutions during his absence from the University, he must have complete official transcripts sent to the Admissions Office of this University from each institution attended. Applications for readmission are considered on the basis of regulations currently in effect.

The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of his last registration at this University and who has not since registered at another institution.

STUDENTS FROM FOREIGN INSTITUTIONS

Application, required records, and scores on the *Test of English as a Foreign Language* (see below) must be received from *foreign applicants* no later than March 1.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send *directly* to the Office of Admissions, George Washington University, Washington, D.C. 20006, official credentials listing subjects studied, grades received, examinations taken, and degrees received. Certified copies of diplomas and certificates from secondary schools and all colleges and universities attended are required. Records of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

LANGUAGE TEST

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language*. Students are responsible for making arrangements for taking the test and should address inquiries to: TOEFL, Educational Testing Service, Princeton, New Jersey 08540, U.S.A. The completed application form should be returned to the Testing Service at Princeton well in advance of the beginning of the semester for which the applicant seeks admission. The test fee, which should be remitted with the application, entitles the student to have his test score sent to three different institutions. Registration for the

Test of English as a Foreign Language does *not* constitute application for a
mission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a descri
tion of the test as well as rules regarding application, fees, reports, and the co
duct of the test; lists of examination centers; examination dates; and an app
cation blank. On the application for the test, the student should specify that t
scores be sent to the Office of Admissions at this University.

In addition to the TOEFL, an admitted student may be required to report
the Admissions Office to make arrangements for taking an English Placeme
Test for foreign students prior to registration. Results of this test will determi
the courses the student will be permitted to register for in his program of stud

FEES AND FINANCIAL REGULATIONS

Fees paid by students cover only a portion of the cost of the operation of th
University. Income from endowment funds, grants, and gifts from alumni an
friends of the institution make up the difference.

The following fees and financial regulations were adopted for the 1974 sum
mer sessions and the academic year 1974–75. (See pages 35–36 for projected
tuition and fee increases for 1975–78.)

Tuition Fees

Full-time on-campus program (12 or more hours), each semester	$1,212.5
Part-time on-campus program, for each semester hour	90.0

University Center Fee (charged all students registered on campus, nonrefundable)

For students registered for 11 or more semester hours on campus: Each semester	43.0
For students registered for less than 11 semester hours in a semester on campus: For each semester hour for which the student registers	4.0
For students maintaining "continuous registration" status: Each semester	4.0

Additional Course Fees

In certain courses offered by Columbian College of Arts and Sciences, additional fees such as laboratory and material fees, are charged as indicated in the course descrip tions in the *Undergraduate and Graduate Catalogue*. These fees are charged by the semester and, unless otherwise indicated, may be defrayed in two payments when the tuition is paid in this manner. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the lab oratory fee, the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Associate in Science	$10.0
Bachelor of Science	25.0

Residence Hall Fees (see page 55)

Special Fees and Deposits

Application fee	$10.00
Advanced tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student	100.00
Housing deposit, nonrefundable, charged each applicant for residence hall space	100.00
Late-registration fee, for failure to register within the designated period	15.00
Late-payment fee, for failure to make payments when due (see "Payment of Fees," pages 36–37)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for non-payment of fees (see "Payment of Fees," pages 36–37)	35.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds	15.00
Continuous Registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements*—due and payable on the official days of registration	90.00
For special physical examination	2.00
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25.00
For each examination to qualify for advanced standing and for each special examination	5.00
English test for foreign students (when required)	5.00
Laboratory checkout fee, for failure to check out of Chemistry laboratory by the date deadline set by the instructor†	3.00
Transcript fee, for each transcript of record	2.00

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES 1975–78

In order that students and their parents may plan more realistically for a total four-year period, tuition increases for the academic years 1975–76, 1976–77, and 1977–78 have been estimated as follows:

Increase by year (full-time undergraduate students):	
1975–76	$ 75.00
1976–77	100.00
1977–78	200.00

* Payment of the continuous registration fee entitles the student who is granted leave of absence to return and continue his work toward a degree under the academic requirements which were in force at the time of his first registration. The continuous registration fee applies toward neither tuition fee nor residence requirements for the degree.
This fee does not apply to students granted military leave, see page 53.

† A student who drops a Chemistry course before the end of the semester must check out of the laboratory at the next laboratory period.

*Increase by semester hour (graduate and part-time undergraduate students):

1975–76	$4.00
1976–77	4.00
1977–78	7.00

The University Center Fee will be increased for the 1975 summer sessions and the academic year 1975–76. For students taking 11 or more semester hours the fee will be $46.50 a semester, an increase of $3.50. Students taking less than 11 semester hours will pay $4.35 a semester hour, an increase of $.35.

Every effort will be made to keep tuition increases within the above limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment in these estimates.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made payable to George Washington University, with the student identification number in the upper left-hand corner.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 23, 1974 (for the fall semester), and March 5, 1975 (for the spring semester). No deferred payment is permitted for the summer session. Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $525 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered the student forfeits his rights to the use of deferred payment contracts in future semesters, and the Students Account Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registering for credit.

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* Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

PREPAID AND DEFERRED PAYMENT PLANS FOR PARENTS

Several commercial programs for parents who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in writing to the Associate Dean for Allied Health Programs. Notification to an instructor is not an acceptable notice (see "Withdrawal," page 51).

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

1. *Complete withdrawal from the University:*

FALL SEMESTER

Withdrawal dated on or before September 6, 1974	90 per cent
Withdrawal dated September 9 to September 20, 1974	75 per cent
Withdrawal dated September 23 to October 4, 1974	50 per cent
Withdrawal dated after October 4, 1974	none

SPRING SEMESTER

Withdrawal dated on or before January 17, 1975	90 per cent
Withdrawal dated January 20 to January 31, 1975	75 per cent
Withdrawal dated February 3 to February 14, 1975	50 per cent
Withdrawal dated after February 14, 1975	none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal by a part-time student*, the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in an undergraduate full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for complete withdrawal from the University (see No. 1 above). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 53).

* Regulations concerning withdrawal and refunds for the summer sessions are stated in the *Summer Sessions Catalogue*.

5. Regulations governing student withdrawals as they relate to resident hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be reduced or refunded because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred and will not be credited to another semester (exception: students granted military leave, see page 53).

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

FINANCIAL AID

The George Washington University has, for full-time undergraduate students, a program of financial assistance consisting of scholarships, loans, grants, part-time employment, or any combination of these resources. The University participates in the National Direct Student Loan, Supplemental Educational Opportunity Grant, and College Work-Study programs. Financial aid is awarded on the basis of the student's scholastic record, financial need, and qualities of leadership. Complete information concerning financial assistance is available from the Office of Student Financial Aid, George Washington University, Washington, D.C. 20006.

REQUIREMENTS FOR THE DEGREE OF ASSOCIATE IN SCIENCE

The satisfactory completion of a minimum of 60 semester hours of course work is required for the degree of Associate in Science; however, some departments may set the requirements above the minimum. The course work must be distributed as follows:

1. **Human Competence**

   A minimum of 6 semester hours in English Composition (Engl 9 or 10, and 11 or 12), plus a minimum of 6 semester hours of meaningful initiation into the humanities, mathematics, or social studies.

2. **Subject Competence**

   The number of semester hours required depends on the student's specific area of concentration. However, students must elect courses related to allied health sciences in biological sciences, mathematics, or physical sciences. (Students may not use the same mathematics courses to satisfy both the human competence (see above) and subject competence requirements.)

3. **Vocational Competence**

   A minimum of 30 semester hours in vocational competence skills related to the area of concentration.

4. **Elective**

   The number of elective hours depends on the number of semester hours of specific required courses the student has in his program of study; in some

programs the student may be allowed to choose electives, but in others he may be required to elect specific courses.

Students who plan to pursue a Bachelor's degree are advised to plan their Associate's degree program so that they will satisfy the prerequisites to the degree of their choice.

SCHOLARSHIP REQUIREMENTS

An over-all quality-point index of 2.00 is required for course work leading to the degree of Associate in Science. A quality-point index of 2.50 is required for course work in the student's area of concentration. See page 50 for explanation of the grading system and the quality-point index.

RESIDENCE REQUIREMENT

A minimum of 18 semester hours of course work in the area of concentration must be satisfactorily completed in residence in the School of Medicine and Health Sciences.

MEDICAL LABORATORY TECHNIQUE PROGRAM

The program of study leading to the degree of Associate in Science with a concentration in Medical Laboratory Technique is offered only to military students off-campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pages 30–31. Mature students who do not meet these requirements *may* be considered for degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of course work taken in residence at George Washington University with a minimum quality-point index of 2.50. The qualifying course work must include 9 semester hours in biological sciences, chemistry, or mathematics, and 6 semester hours in at least two other areas.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 61 semester hours of course work is required:

Nonclinical Course Work	Semester Hours
Engl 9 or 10, and 11 or 12 (or equivalent)	6
Math 3 and 6 (or equivalent)	6
Chem 9 or 11 (or equivalent)	4
	16
Clinical Course Work	
Path 11, 12, 13, 14, and 15	45
Total	61

MEDICAL SERVICE TECHNOLOGY PROGRAM

The program of study leading to the degree of Associate in Science with a con centration in Medical Service Technology is currently available only to militar personnel at off-campus military installations.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on page 30–31. Mature students who do not meet these requirements *may* be considered for degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of course work taken in residence at George Washington University with a minimum quality-point index of 2.50. The qualifying course work must include 9 semester hours in the Department of Epidemiology and Environmental Health and 6 semester hours in at least two other departments.

DEGREE REQUIREMENTS

The satisfactory completion of 62 semester hours of course work is required.

	Semester Hours
Courses Outside the Area of Concentration	
Engl 9 or 10, and 11 or 12 (or equivalent)	6
Psyc 1 or Soc 1	3
Elective (to be selected in consultation with the adviser)	6
	15
Area of Concentration	
Epid 10, 11, 15, 16, 22, 67, 68, 92, 93, 94, 95, 96	47
Total	62

NUCLEAR MEDICINE TECHNOLOGY PROGRAM

The program of study leading to the degree of Associate in Science with a concentration in Nuclear Medicine Technology is offered both on and off campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pages 30–31. A personal interview may be required of some students. Mature students who do not meet the standard requirements may be considered for admission to degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of course work taken in residence at George Washington University with a minimum quality-point index of 2.50.

DEGREE REQUIREMENTS

The satisfactory completion of 60 semester hours of course work is required:

	Semester Hours
Courses Outside the Area of Concentration	
Engl 9 or 10, and 11 or 12 (or equivalent)	6
Social Sciences (as determined by the faculty adviser; Psyc 1 recommended)	3

	Semester Hours
Humanities (selected from Art, Music, Philosophy, or Religion)	3
	12
Area of Concentration	
Rad 41, 55, 56, 57, 58, 59, 65, 66, 72, 75, 81, 82, 93, 94, 98	48
Total	60

RADIOLOGIC TECHNOLOGY PROGRAM

The program of study leading to the degree of Associate in Science with a concentration in Radiologic Technology is currently offered both on and off campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pages 30–31. In addition, a letter of recommendation from the student's high school principal or his dean at an institution previously attended is required. A personal interview may be required of some students. Mature students who do not meet the standard requirements may be considered for admission to degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of course work taken in residence at George Washington University with a minimum quality-point index of 2.50.

DEGREE REQUIREMENTS

The satisfactory completion of 61 semester hours of course work is required:

Courses Outside the Area of Concentration	Semester Hours
Engl 9 or 10, and 11 or 12 (or equivalent)	6
Social Sciences (as determined by the faculty adviser)	3
Humanities (as determined by the faculty adviser)	3
	12
Area of Concentration	
Rad 40, 50, 51, 60, 61, 62, 70, 71, 80, 90, 95, 96, 97, 99	49
Total	61

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

The satisfactory completion of a minimum of 120 semester hours of course work is required for Bachelor of Science programs; however, some departments may set the requirements above the minimum. The course work must be distributed as follows:

1. **Human Competence**

   A minimum of 6 semester hours in English Composition (Engl 9 or 10, and 11 or 12) plus 24 semester hours in meaningful initiation into any two of the three general areas of the humanities, mathematics, or social studies.

2. **Subject Competence**
   A minimum of 30 semester hours of didactic information related to the allied health sciences. This requirement may include the biological sciences, mathematics, or the physical sciences.

3. **Vocational Competence**
   A minimum of 60 semester hours in vocational competence skills related to the area of concentration.

SCHOLARSHIP REQUIREMENTS

An over-all quality-point index of 2.00 is required for course work in programs leading to the Bachelor of Science degree. A quality-point index of 2.50 is required for course work in the student's area of concentration. See page 5 for explanation of the grading system and the quality-point index.

RESIDENCE REQUIREMENT

A minimum of 30 semester hours of course work in the area of concentration must be satisfactorily completed in residence in the School of Medicine and Health Sciences.

ENVIRONMENTAL HEALTH PROGRAM

The Bachelor of Science curriculum in Environmental Health is designed to provide students with the requisite training to function effectively as Environmental Health Officers in domestic and foreign areas. Candidates are prepared for participation in community or regional program planning, community education, staff personnel training, and supervision in official or voluntary health organizations.

RESIDENCE

See above for general residence requirement. Candidates for the degree of Bachelor of Science in the field of Environmental Health must complete the last 30 semester hours in residence, including at least 12 hours in Epidemiology and Environmental Health courses, unless special permission is granted to take work elsewhere. This requirement applies to students transferring within the University as well as to students transferring from other institutions.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours, as outlined below, is required for the degree of Bachelor of Science in the field of Environmental Health:

FIRST AND SECOND YEARS

	Semester Hours
Communications	
Engl 9 or 10, and 11 or 12	6
Engl 20; Sp&D 111 or 121	6

	Semester Hours
Humanities	
Twelve semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72, 91–92; Foreign Language (2 years of one language); Phil 50	12
Natural and Mathematical Sciences	
BiSc 11–12, Chem 11–12	16
Six semester hours selected from the following: Math 3, 6, 9, 10, 30, 31, 51, 52; Stat 51, 101–2	6
Social Studies	
Six semester hours selected from one of the following combinations: Anth 1–2; Econ 1–2; Psyc 1 and 8, Psyc 1 and 22; or Soc 1 and 2	6
Elective (selected with the approval of the adviser)	8
	60

THIRD AND FOURTH YEARS

Concentration Requirements (to be selected, in consultation with the adviser, from the following Epidemiology and Environmental Health courses)	30
Environmental Sanitation—Epid 101, 102, 103, 104	
Public Health Epidemiology—Epid 121, 122, 123, 131	
Public Health Entomology—Epid 121, 142, 143, 144	
Public Health Microbiology—Epid 151, 152, 153, 154	
Occupational Health—Epid 171, 172	
Public Health Administration—Epid 191, 192	
Practicum Requirement (This requirement may be waived with the approval of the Department; however, students will be required to substitute 12 semester hours of approved courses.) Epid 180	12
Elective	
100-level courses in two or more related departments in consultation with the faculty adviser, selected from Anthropology, Biological Sciences, Chemistry, Geology, Psychology, and Sociology	18
Total	120

MEDICAL TECHNOLOGY PROGRAM

The satisfactory completion of 120 semester hours of course work is required for the degree of Bachelor of Science in the field of Medical Technology.

RESIDENCE REQUIREMENT

A minimum of 60 semester hours must be spent in residence for the degree of Bachelor of Science in the field of Medical Technology, including the 12-month Medical Technology program at the University Hospital in the fourth year (Path 115–16, 117–18, 119–20).

CURRICULUM

FIRST TWO YEARS

		Semester Hours
Engl:	Engl 9 or 10, and 11 or 12	
Humanities:	Six semester hours selected from one of the following combinations: Art 31–32; Art 71–72; Engl 51–52; Engl 71–72; Engl 91–92; Mus 3 and 4; Rel 9 and 10; or Rel 59–60	
Math:	Math 3, 6	
	NOTE: the Math 3 requirement may be satisfied by offering two years of high school algebra acceptable for admission; the Math 6 requirement may be satisfied by offering one-half year of high school trigonometry acceptable for admission.	
Science:	BiSc 11–12, 111	
	Chem 11–12, 22	
Social Studies:	Six semester hours selected from one of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; PSc 4 and 6; PSc 5 and 6; or Soc 1 and 2	
Elective:	Courses other than science	

THIRD YEAR

Chem 50	
Four semester hours selected from BiSc 104, 127, 148, 154, 163 and 164, or 165	
Elective (courses other than science)	

FOURTH YEAR

Path 115–16	
Path 117–18	
Path 119–20	
Total	

The fourth-year courses constitute the major. Each candidate must make application to take the 12-month Medical Technology program at the University Hospital; this should be done early in the third year. Although admission to the degree program does not assure acceptance into the Medical Technology program at the Hospital, George Washington University students are given preference. A number of scholarships are provided by the University Hospital to students in the fourth year of the degree program.

PHYSICIAN'S ASSISTANT PROGRAM

The program leading to the degree of Bachelor of Science with designation as Physician's Assistant requires the satisfactory completion of 120 semester hours of course work.

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 30–31. Three letters of recommendation and a personal interview are also required.

DEGREE REQUIREMENTS

All students must complete the 30-semester-hour requirement in the area of human competence (see page 41). The subject and vocational area requirements are satisfied by the completion of a 90-semester-hour sequence of required and elective courses, distributed as follows:

	Semester Hours
1. Basic Health Sciences (18 weeks)	
Med 101: Normal Structure and Function of Man	9
Med 109: Human Behavior I	2
Med 113: Medicine and Society	1
Med 116: Medical Terminology	1
Med 119: Introduction to Patient Care I	1
	14
2. Clinical Health Sciences (26 weeks)	
Med 125: Manifestation of Disease	7
Med 128: Mechanisms of Disease	6
Med 131: Human Behavior II	1
Med 134: Introduction to Patient Care II	1
Med 137: Dynamics of the Life Cycle	1
Med 140: Clinical-Pathological Correlation	1
Med 146: Animal Surgery	3
Med 147: Introduction to Radiology	2
Med 148: Introduction to Electrocardiography	2
Med 150: History-taking Review and Theory	1
Med 151: Clinical Pharmacology	1
Med 152: Introduction to Basic Laboratory Medicine	3
Med 158: Pharmacology	2
	31
3. Clinical Clerkship (48 weeks)	
Med 160: Medical Inpatient	4
Med 163: Medical Outpatient	4
Med 166: General Surgery	4
Med 169: Obstetrics and Gynecology	4
Med 172: Pediatric Outpatient	4
Med 175: Primary Care Preceptorship	12
Med 178: Emergency Room	4
Med 198: Psychiatric Outpatient	3
Elective	6
	45

CERTIFICATE

A certificate is awarded upon completion of the 90-semester-hour sequence of required and elective courses in Medicine.

NURSE ANESTHETIST PROGRAM

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pag 30–31. Candidates for the degree of Bachelor of Science with designation Nurse Anesthetist must also fulfill the following requirements:

1. They must have graduated from a National League of Nursing accredite school of nursing.
2. They must be licensed as a registered professional nurse in at least on state or the District of Columbia.
3. They must satisfy the requirements of a school of anesthesia at an affiliate hospital.

ADVANCED STANDING

General provisions for advanced standing are stated on pages 31–33. In addi tion, students in the Nurse Anesthetist Bachelor's degree program may b granted advanced standing for the following:

1. Students who hold a Bachelor's degree in nursing may receive up to 6 semester hours' credit: (a) 30 hours' credit for vocational skills and o completion of the National League of Nursing examination in medica surgical nursing; and (b) 30 hours' credit in subjects relating to huma competence, which must include a minimum of 6 semester hours in Eng lish and meaningful initiation into two areas selected from among lan guage, social studies, humanities, and general mathematics.
2. Students who are graduates of nursing schools which award some type o diploma other than a Bachelor's degree will receive 30 semester hours credit for nursing school (vocational) skills on completion of the Nationa League of Nursing examination on medical-surgical nursing (Parts I and II). These students may also receive credit on an individual basis fo course work in the area of human competence which they have earned at an accredited college or university.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is required for the degree of Bachelor of Science with designation as Nurse Anesthetist. However, since all students enter the program with a minimum of 30 semester hours of advanced standing (see Nos. 1(a) and 2 above), the number of hours actually completed at this University will be 90 or less. Thirty semester hours in the area of vocational competence are required, consisting of the following courses: Anat 115; Anes 190, 191, 192, 193; Phar 21, 22, 110, 120; Phyl 115. In addition, students must complete a minimum of 9 semester hours in clinical anesthesiology (Anes 194).

CERTIFICATE

Students who do not wish to apply for degree candidacy may qualify for a Certificate in Nurse Anesthesia by satisfactorily completing a 21-semester-hour program consisting of the following courses: Anat 115; Anes 192, 193; Phar 21, 22, 110; Phyl 115.

NURSE PRACTITIONER PROGRAM

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 30–31. Candidates for the degree of Bachelor of Science with designation as Nurse Practitioner must also fulfill the following requirements:

1. They must have been graduated from a school of nursing with an over-all quality-point index of at least 2.00 or the equivalent.
2. They must be licensed as registered nurses in at least one state or the District of Columbia.
3. They must have had a minimum of three years' experience in nursing practice in hospital and ambulatory settings.
4. They must have three letters of recommendation forwarded from employers, supervisors in the health field, and/or acquaintances.

Preference will be given to applicants who have made arrangements with a physician or an institution to be employed as a nurse practitioner. Both the physician or institution and the applicant must agree to participate in the program.

ADVANCED STANDING

General provisions for advanced standing are stated on pages 31–33. In addition, students in the Nurse Practitioner Bachelor's degree program may receive up to 30 semester hours of advanced standing in the area of vocational competence for successful completion of the National League for Nursing examination in medical-surgical nursing or for clinical training in a nursing education program. No advanced standing will be granted in the required 46-semester-hour area of concentration.

RESIDENCE REQUIREMENT

A minimum of 46 semester hours of course work in the area of concentration must be completed in residence in the School of Medicine and Health Sciences.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is required for the degree of Bachelor of Science with designation as Nurse Practitioner, distributed as follows:

1. 30 semester hours of course work in the area of Human Competence, including Engl 9 or 10, and 11 or 12, and 6 semester hours of meaningful initiation into two of these areas—social studies, humanities, and mathematics.
2. 30 semester hours of course work in the area of subject competence, including 21 hours in the physical or natural sciences and 3 hours in the mathematical sciences, the latter in addition to any mathematics course taken to satisfy the vocational competence requirement.
3. 60 semester hours in the area of vocational competence, including a 37-week sequence in the 46-semester-hour area of concentration, consisting of the following courses: Med 109, 119, 125, 128, 131, 134, 137, 140, 142, 143, 153, 154, 157, 158, 163, 179.

NURSE ANESTHETIST PROGRAM

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 30–31. Candidates for the degree of Bachelor of Science with designation as Nurse Anesthetist must also fulfill the following requirements:

1. They must have graduated from a National League of Nursing accredited school of nursing.
2. They must be licensed as a registered professional nurse in at least one state or the District of Columbia.
3. They must satisfy the requirements of a school of anesthesia at an affiliated hospital.

ADVANCED STANDING

General provisions for advanced standing are stated on pages 31–33. In addition, students in the Nurse Anesthetist Bachelor's degree program may be granted advanced standing for the following:

1. Students who hold a Bachelor's degree in nursing may receive up to 60 semester hours' credit: (a) 30 hours' credit for vocational skills and/or completion of the National League of Nursing examination in medical-surgical nursing; and (b) 30 hours' credit in subjects relating to human competence, which must include a minimum of 6 semester hours in English and meaningful initiation into two areas selected from among language, social studies, humanities, and general mathematics.
2. Students who are graduates of nursing schools which award some type of diploma other than a Bachelor's degree will receive 30 semester hours' credit for nursing school (vocational) skills on completion of the National League of Nursing examination on medical-surgical nursing (Parts I and II). These students may also receive credit on an individual basis for course work in the area of human competence which they have earned at an accredited college or university.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is required for the degree of Bachelor of Science with designation as Nurse Anesthetist. However, since all students enter the program with a minimum of 30 semester hours of advanced standing (see Nos. 1(a) and 2 above), the number of hours actually completed at this University will be 90 or less. Thirty semester hours in the area of vocational competence are required, consisting of the following courses: Anat 115; Anes 190, 191, 192, 193; Phar 21, 22, 110, 120; Phyl 115. In addition, students must complete a minimum of 9 semester hours in clinical anesthesiology (Anes 194).

CERTIFICATE

Students who do not wish to apply for degree candidacy may qualify for a Certificate in Nurse Anesthesia by satisfactorily completing a 21-semester-hour program consisting of the following courses: Anat 115; Anes 192, 193; Phar 21, 22, 110; Phyl 115.

NURSE PRACTITIONER PROGRAM

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 30–31. Candidates for the degree of Bachelor of Science with designation as Nurse Practitioner must also fulfill the following requirements:

1. They must have been graduated from a school of nursing with an over-all quality-point index of at least 2.00 or the equivalent.
2. They must be licensed as registered nurses in at least one state or the District of Columbia.
3. They must have had a minimum of three years' experience in nursing practice in hospital and ambulatory settings.
4. They must have three letters of recommendation forwarded from employers, supervisors in the health field, and/or acquaintances.

Preference will be given to applicants who have made arrangements with a physician or an institution to be employed as a nurse practitioner. Both the physician or institution and the applicant must agree to participate in the program.

ADVANCED STANDING

General provisions for advanced standing are stated on pages 31–33. In addition, students in the Nurse Practitioner Bachelor's degree program may receive up to 30 semester hours of advanced standing in the area of vocational competence for successful completion of the National League for Nursing examination in medical-surgical nursing or for clinical training in a nursing education program. No advanced standing will be granted in the required 46-semester-hour area of concentration.

RESIDENCE REQUIREMENT

A minimum of 46 semester hours of course work in the area of concentration must be completed in residence in the School of Medicine and Health Sciences.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is required for the degree of Bachelor of Science with designation as Nurse Practitioner, distributed as follows:

1. 30 semester hours of course work in the area of Human Competence, including Engl 9 or 10, and 11 or 12, and 6 semester hours of meaningful initiation into two of these areas—social studies, humanities, and mathematics.
2. 30 semester hours of course work in the area of subject competence, including 21 hours in the physical or natural sciences and 3 hours in the mathematical sciences, the latter in addition to any mathematics course taken to satisfy the vocational competence requirement.
3. 60 semester hours in the area of vocational competence, including a 37-week sequence in the 46-semester-hour area of concentration, consisting of the following courses: Med 109, 119, 125, 128, 131, 134, 137, 140, 142, 143, 153, 154, 157, 158, 163, 179.

CERTIFICATE

Nurse Practitioner certification will be granted to those students who meet the requirements for admission to the degree program and who complete the 46-semester hour area of concentration without completing the remainder of the requirements for the Bachelor of Science degree.

RADIOLOGIC SCIENCES AND ADMINISTRATION PROGRAM

The program leading to the degree of Bachelor of Science in the field of Radiologic Sciences and Administration requires the satisfactory completion of a minimum of 120 semester hours of course work. Students may specialize in Diagnostic Radiology, Nuclear Medicine, or Radiation Therapy.

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 30–31. A letter of recommendation from the principal or dean of the school previously attended and a personal interview are also required.

ADVANCED STANDING

General provisions for advanced standing are stated on pages 31–33. Students (1) who have completed study within the last two years at an accredited Radiologic Technology, Radiotherapy, or Nuclear Medicine Technology school; (2) who are certified by the Council on Medical Education of the American Medical Association upon recommendation of the Joint Review Committee on Educational Programs in Radiologic Technology; and (3) who have a grade average of 85 per cent or a quality-point index of 2.75 or better may be granted up to 64 semester hours of advanced standing credit.

SCHOLARSHIP

Scholarship requirements are stated on pages 50–51. Candidates for the degree of Bachelor of Science with a concentration in Radiologic Sciences and Administration must complete the first two years of the program with a quality-point index of 2.75 or better in order to begin the final two years of the program.

DEGREE REQUIREMENTS

AREA OF HUMAN COMPETENCE

A minimum of 30 semester hours is required. Specific required courses are BAd 102, 105; Engl 9 or 10, and 11 or 12; Psyc 1; and Soc 124. Recommended electives include Acct 1; C1En 101; Engl 20; Hum 26; Psyc 144, 151; Soc 129. Students specializing in Nuclear Medicine cannot choose C1En 101 or Hum 26 as electives, since these courses are required in their area of vocational competence.

AREA OF SUBJECT COMPETENCE

A minimum of 30 semester hours is required. Specific course requirements are as follows:

In the Diagnostic Radiology Specialization.—Rad 62, 70, 71, 80, 95, 96
In the Nuclear Medicine Specialization.—Rad 65, 66, 75, 81, 82, 93, 94
In the Radiation Therapy Specialization.—Rad 62, 70, 71, 75, 80, 93, 95
In All Three Specializations.—Epid 230 or Stat 91; Med 101

AREA OF VOCATIONAL COMPETENCE

Diagnostic Radiology Specialization

The following courses, a total of 64 semester hours, are required: HCA 203; Med 125; Rad 40, 50, 51, 60, 61, 90, 97, 99, 140, 141, 170, 171, 175, 190.

Nuclear Medicine Specialization

The following courses, a total of 61 semester hours, are required: C1En 101; HCA 203; Hum 26; Rad 41, 55, 56, 57, 58, 59, 72, 98, 140, 142, 170, 171, 176, 190.

Radiation Therapy Specialization

Students specializing in Radiation Therapy must enter the program with a minimum of 21 semester hours of advanced standing from an accredited radiotherapy school, since the University's School of Medicine and Health Sciences at present has no Associate's program in the field. Advanced standing credit must include courses in clinical experience and training, pathology, principles of radiotherapy, technical radiotherapy, treatment planning, and clinical oncology.

In addition to the 21 semester hours of advanced standing, students must complete the following courses, a total of 50 semester hours: C1En 101; HCA 203; Med 125; Rad 50, 51, 90, 99, 140, 143, 170, 171, 177, 190.

REGULATIONS

A student enrolled in the University is required to conform to the following regulations and to comply with the rules and regulations of the college, school, or division in which he is registered.

A student who withdraws or is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue his work only under the rules and regulations in force at the time of his return.

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, his registration may be cancelled. If such falsification is discovered after the student has established an academic record at the University, he may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Faculty) for subsequent registration in the University.

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered. Regular

attendance is expected. A student may be dropped from any course for undue absence.

SCHOLARSHIP

A student who fails to maintain the scholarship requirements of the School of Medicine and Health Sciences may be dismissed from the University.

GRADES

Grades are mailed to the student through the Office of the Registrar at the close of each semester. They are not given out by instructors.

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal. In certain courses, an alternate grading system of *CR* (Credit) and *NC* (No Credit) may be used. Except for courses which specifically state that repetition for credit is permitted, a candidate for a degree at this University may not repeat for credit a course in which he has received a grade of *D* or better, unless required to do so by the department concerned. A written statement to this effect must be submitted to the Registrar by the appropriate department chairman.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given the instructor for the student's failure to complete the required work of the course. At the option of the instructor, the grade of *I* may be recorded if a student, for reasons beyond his control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons before the date when grades must be reported. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, he may initiate an appropriate grade change. A grade of *I* automatically becomes a grade of *F* one calendar year after the date of the last class meeting in the semester for which the grade of *I* was assigned.

THE QUALITY-POINT INDEX

Scholarship is computed in terms of the quality-point index, obtained by dividing the number of quality points by the number of semester hours for which the student has registered, both based on his record in this University. Quality points are computed from grades as follows: *A*, four points; *B*, three points; *C*, two points; *D*, one point; *F*, no points, for each semester hour for which the student has registered. Courses in which the grades of *W* or *I* are assigned are not considered in determining the index, except that a course in which the grade of *I* has been assigned will be considered when a formal grade has been recorded. Grades earned at other institutions are not considered in computing the quality-point index.

PROBATION

A student who has attempted a minimum of 12 semester hours of course work and whose cumulative quality-point index is below 2.00 is placed on probation for the period in which he or she next attempts 12 additional semester hours of work.

SUSPENSION

A student whose quality-point index remains below 2.00 after a 12-semester-hour period of probation is suspended.

A student suspended for poor scholarship may not register for course work, even as an auditor. The student may apply for readmission after the lapse of either the fall or spring semester following suspension. Evidence must then be presented to the chairman of the department concerned demonstrating a better qualification to pursue college-level course work. A student suspended twice for poor scholarship may not be readmitted after the second suspension.

ACADEMIC DISHONESTY

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the Executive Committee of the Medical Center, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the Executive Committee of the Medical Center, the disciplinary grade of "Failure—Academic Dishonesty" will be recorded for the course involved, and this grade will be employed in the computation of the quality-point index or academic standing. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

WITHDRAWAL

Withdrawal from a course or from the University requires the permission of the Associate Dean for Allied Health Programs. Permission to withdraw from the University will not be granted a student who does not have a clear financial record (see "Withdrawals and Refunds," pages 37–38).

All charges for courses dropped without the approval of the Associate Dean for Allied Health Programs must be met by the student. Reporting the dropping of a course to an instructor does not effect its discontinuance.

CHANGES IN PROGRAM OF STUDY

Changes within the School of Medicine and Health Sciences' Allied Health Programs.—A student may not substitute one course for another, drop courses (see "Withdrawal," above), change his status from credit to audit or audit to credit without the approval of the Associate Dean for Allied Health Programs.

Change from one section to another of the same course may be made with the approval of the Associate Dean for Allied Health Programs and the chairman of the department concerned.

Change from one area of concentration to another within the School of Medicine and Health Sciences may be made with the approval of the Associate Dean

for Allied Health Programs. All requirements of the course of study to which the change is made must be met.

Transfer within the University.—Application for transfer to another college, school, or division must be made to the Office of Admissions.

A maximum of 45 semester hours earned in the Division of University Students may be applied toward a Bachelor's degree in the School of Medicine and Health Sciences.

CREDIT

Credit is given only after registration for a course and satisfactory completion of the required work, or upon the assignment of advanced standing in accordance with the regulations of the several colleges, schools, and divisions.

Auditing.—A person who has been admitted to the University may be registered, with the permission of the instructor, as an "auditor" in a class (no academic credit). An auditor is not required to take active part or to pass examinations. A student who takes a course as an auditor may not repeat it later for credit.

SUMMER SCHOOL CREDIT

A student who plans to attend summer school at another institution and apply credit so earned toward graduation from this University must first secure the written approval of the Associate Dean for Allied Health Programs. In no event will credit in excess of what might be earned in a similar period in this University be recognized.

BALANCE SHEET

On request, the Associate Dean for Allied Health Programs will issue to undergraduate degree candidates a balance sheet showing the amount of work completed and the requirements remaining to be met for the degree. A second balance sheet is issued only if the student changes major or degree objectives.

TRANSCRIPTS OF RECORD

Official transcripts of student records are issued on request of the student or former student who has a clear financial record. A fee of two dollars is charged for each transcript.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* degree requirements are satisfied. Students who have completed course registration must maintain continuous registration by paying the "continuous registration" fee (see page 35). By failing to register for one semester or more, the student breaks his registration and must be readmitted (see "Readmission," page 33). A "Readmitted Student" is required to satisfy the curriculum requirements existing at the time of his readmission.

Students must be registered during the summer if they are taking courses or are expecting to graduate at the end of the Summer Sessions.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to his dean of a copy of his orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, he must apply for readmission to the University well in advance of the semester in which he expects to return. Payments for tuition and fees which are not refunded to the student at the time he is granted military leave will be maintained as a deferred credit for his account and use upon his return to the University.

GRADUATION REQUIREMENTS

Degrees are conferred in February, May, and September.

To be recommended by the Faculty for graduation a student must have met the admission requirements of the college or school in which he is registered; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which he is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session immediately preceding the awarding of a degree.

Application for Graduation.—An "Application for Graduation" form *must* be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the senior or final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

Scholarship.—The student must meet the scholarship requirements for the particular degree for which he is registered.

Curriculum.—Minimum curriculum requirements for each degree are stated on pages 38–39, 41–42.

Residence.—A minimum of 18 semester hours of course work in the area of concentration for the Associate in Science degree and a minimum of 30 semester hours of course work in the area of concentration for the Bachelor of Science degree must be completed while registered in the School of Medicine and Health Sciences. This requirement applies to students transferring within the University as well as to students transferring from other institutions.

Attendance and Conduct.—The University reserves the right to refuse to confer a degree upon a candidate whose attendance or conduct has been unsatisfactory.

WITH DISTINCTION

In all undergraduate divisions of the University the degree may be conferred "With Distinction," at the discretion of the faculty, if a student meets the specific requirements of his college or school.

Students in the Allied Health Sciences programs must have a quality-point index of 3.50 or higher in all course work taken at this institution. To be eligible a student must have completed at this institution at least one-half of the courses required for the degree.

THE LIBRARIES

Students in Allied Health programs have the privilege of using the University Library and the School of Medicine and Health Sciences Library. The stacks are open, and all students are welcome to browse at their leisure. The current Registration Card must be presented when books are borrowed for outside use.

All students using the libraries are expected to be familiar with the regulations governing their use, which are available at each library.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; dates of attendance; verification of date and place of birth; degrees earned (if any), date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1, above.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "Lost and Found" Office is maintained on campus in the Safety and Security Office.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 251–53) contains regulations recently approved by the University's Board of Trustees.

STUDENT AFFAIRS

The Office of the Vice President for Student Affairs develops student life programs, policies, and procedures to complement the University's formal instruction program. These activities are implemented through the offices of the Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Educational Opportunity Program, Housing, International Students, Student Activities, Student and Alumni Career Services, and Student Health Service. More detailed information on these and other activities is contained in the *Student Handbook*.

HOUSING

Complete information concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20006. Information concerning off-campus housing near the University may be obtained at this Office. The reservation of rooms in private houses must be made by students.

Admission to the University does not include a room reservation. The student will receive, with his notification of acceptance, University residence hall information, an application for residence hall space, and a declaration of intent to attend the University. The application for residence hall space must be accompanied by a $100 *nonrefundable deposit*. The housing deposit is credited toward the first semester's room charge. Rooms are leased for the academic year, and lease payment must be made by July 15 for the fall semester.

1974–75 RESIDENCE HALL RATES PER PERSON FOR TWO SEMESTERS*

For Men:	
Calhoun Hall	
double room	$875
triple room	825
For Women:	
Strong Hall	
single room	925
double room	875
For Men and Women:	
Crawford Hall (limited to sophomores, juniors, and seniors)—double room	825
Mitchell Hall (limited to sophomores, juniors, and seniors)—single room	925
Thurston Hall	
double room, triple room, large room for four	875
suite for six	825

* Residence hall rates subject to change.

FOOD SERVICE

Resident freshmen and sophomores are required to participate in the food service plan. Freshmen must participate in the seven-day, 20 meals per week plan, at the rate of $720* for the academic year. Sophomores may elect either the 20-meal plan or a five-day meal plan, 15 meals Monday through Friday, for $690* for the academic year. Each plan is optional for junior, senior, and graduate students. Food service payment does not cover University intersession or vacation periods. All meal cards admit bearer to the dining room in Thurston Hall and the second floor contract dining room in the Cloyd Heck Marvin Center.

MUNSON HALL APARTMENTS

Munson Hall is a University-owned and operated apartment house containing 15 one-bedroom and 54 efficiency apartments. Graduate and married students are given priority for residency until July 15 each year. Seniors and juniors who have lived at least one year in University residence halls will be considered for residency after that date if space is available. All leases are for 12 months.

STUDENT HEALTH SERVICE

The Student Health Service is an outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the academic year from 9 a.m. to 5 p.m. and from 6 p.m. to 10 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. This schedule is also maintained during the Summer Sessions, except that the evening closing hour Monday through Friday is 9 p.m.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed his connection with the University is ineligible for medical benefits of the Student Health Service. Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, X-ray work and referrals to specialists or other outside physicians) are the responsibility of the student. Within the Student Health Service, there will be only a few small charges for some services, such as materials for an allergy injection series, overseas immunizations, and certain other services.

Any student who intends to train for an athletic team is required to pass a thorough medical examination. The University is not responsible for injuries received in intercollegiate or intramural games, or in any of the activities of the Department of Physical Education, Health, and Recreation.

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* Food service prices subject to change.

HEALTH AND ACCIDENT INSURANCE

The Student Health Service has arranged for and endorsed group health and accident insurance, on an elective basis, for those full-time students who do not have other coverage. Interested students should contact the Student Health Service Office.

VETERANS EDUCATION

The Office of the Registrar, Luther Rice Hall, 2121 Eye Street, N.W., assists students entitled to educational benefits as veterans or war orphans with any problems which may arise concerning their benefits. This Office also processes certification of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.



Medical students use the advanced audiovisual equipment available in the Paul Himmelfarb Health Sciences Library.

When feasible, students entitled to benefits as veterans or war orphans should consult the Office of the Registrar prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D.C. 20421.

Facilities

Walter G. Ross Hall.—Walter G. Ross Hall was dedicated and opened in May, 1973. This modern facility provides the teaching and laboratory facilities for students in the School of Medicine and Health Sciences. It occupies a city block of Washington on the northwest edge of the University campus, and its gross area is approximately 550,000 square feet, more than 10 acres. The building is equipped with modern audio-visual and other teaching equipment as well as basic science laboratories.

Paul Himmelfarb Health Sciences Library.—The Paul Himmelfarb Health Sciences Library, adjacent to Walter G. Ross Hall, is a modern facility that seats 400 individuals at a time. The Library has a capacity of 80,000 volumes and subscribes to 1,500 scientific periodicals. Its collection includes 18th- and 19th-century medical and surgical texts and many rare books. The Library is equipped with self-study educational units composed of 12 audio-visual carrels, each of which is filled with its own film and sound projection equipment.

The George Washington University Hospital.—This 550-bed hospital, including the Eugene Meyer Pavilion, is adjacent to the School of Medicine and Health Sciences. It is the primary clinical teaching facility for the students and for a large house staff. It is fully approved and accredited by the American Medical Association, the American Hospital Association, the American College of Physicians, and the American College of Surgeons, through the Joint Commission for the Accreditation of Hospitals. Annual patient admissions number approximately 20,000.

The Watson Wise Emergency Pavilion of the Hospital logs in approximately 40,000 patient visits annually and is one of the city's most active emergency units.

The University Hospital is equipped to serve 16 specialty fields. Complex teamwork procedures such as renal dialysis, a computerized X-ray unit for diagnosing brain diseases, cardiac catheterization, open-heart surgery, transplant surgery, and total hip replacements are included in its activities. Facilities include a surgical suite of ten rooms, two of which are equipped with overhead galleries where observers may communicate with the surgical teams, observe the electronic patient-monitoring system in action, and view the intricate surgical procedures below.

The Helen L. and Mary E. Warwick Memorial Building.—This building houses a computerized multitest facility that is available to physicians for patient evaluation.

The University Clinic.—The Clinic is housed in the 13-story H.B. Burns Memorial Building, where ambulatory care is consolidated and integrated with

in the teaching program. The academic group practice of physicians in general medicine and more than 20 specialties is based in the Burns Building. Visits of ambulatory patients number approximately 90,000 annually.

AFFILIATED HOSPITALS

Children's Hospital National Medical Center.—Children's, one of the finest pediatric health care centers in the country, houses 220 inpatient beds, including a specialized referral intensive care nursery and an adolescent unit. Its ambulatory Diagnostic and Treatment Center handles in excess of 120,000 visits a year. Children's is the major base for the School of Medicine and Health Science's Department of Child Health and Development, and for the assigned pediatric clerkship. A variety of elective opportunities are offered in various aspects of child health.

Columbia Hospital for Women.—This hospital, situated two blocks from the University Hospital, is utilized by medical students for training in obstetrics and gynecology. Columbia Hospital for Women is an affiliated hospital for residency training in Obstetrics and Gynecology in the George Washington University Medical Center Program.



Fairfax Hospital.—This 530-bed voluntary community teaching hospital serves a burgeoning surburban area and provides all clinical services including psychiatry. Each year over 20,635 patients are admitted, 4,900 babies delivered, 15,000 surgical operations performed, and 49,200 persons examined and treated in the Emergency Suite. Fairfax Hospital offers a rotating internship program, a School of Medical Technology, and clinical facilities for a School of Practical Nursing. Students of the School of Medicine and Health Sciences serve at this hospital in clinical clerkship and elective programs. Fairfax Hospital is an affiliated hospital for residency training in Obstetrics and Gynecology in the George Washington University Medical Center Program.

Holy Cross Hospital.—Holy Cross, a modern 338-bed hospital, is a primary clinical campus which provides students with first-hand exposure to the practice of medicine in the community. It is a private, voluntary facility in which the full range of medical, surgical, and pediatric services are provided for a growing suburban population. Last year, over 19,000 patients were hospitalized, nearly 47,000 emergency visits were registered, and 3,263 babies were delivered at Holy Cross. The hospital, which has consistently experienced one of the highest occupancy rates in the Washington metropolitan area, is planning an expansion to include an additional 112 beds, enlarged emergency room facilities, and a new, self-contained center for in-and-out surgery.

National Naval Medical Center.—The Naval Hospital at the National Naval Medical Center, Bethesda, Maryland, is a 750-bed general hospital offering a wide range of specialized services, clinical research, and educational programs. Medical care is provided to active duty and retired military members and their dependents. It is a major referral center for thoracic and cardiovascular surgery as well as for cancer therapy. The teaching staff directs a complete internship and residency program in 21 specialties.

St. Elizabeths Hospital.—St. Elizabeths Hospital, established by an act of Congress in 1855, is a federal psychiatric hospital administered under the Department of Health, Education, and Welfare. This hospital provides for the treatment, care, and general well-being of approximately 6,000 patients of whom 3,400 are resident. The facility includes a completely approved General Hospital to meet the needs for medical and surgical care and functions with a full-time staff within the hospital plus attending physicians in various specialties. The hospital maintains an up-to-date medical library.

Medical students of George Washington University utilize the facilities of St. Elizabeths for clinical psychiatric training. Opportunities for research are enhanced by a cooperative arrangement with the National Institute of Mental Health of the United States Public Health Service.

Veterans Administration Hospital.—In addition to the medical, surgical, psychiatric, neurological, tubercular, and physical medicine and rehabilitation services, this 700-bed hospital has a large outpatient program; an extensive medical research program; programs in open heart surgery, cobalt therapy, and renal dialysis; a metabolic program; and a specially designed Administrative Research Laboratory.

Washington Hospital Center.—This 843-bed private, voluntary institution serves the greater Washington area through a triad of activities: patient care, teaching, and research. The Center is the tenth busiest of more than 7,000 hospitals in the United States and the second busiest private hospital in terms of inpatient admissions. A very active emergency service cares for more than 49,000 patients a year, and the 50 clinics provide all major clinical service ex-

cept pediatrics for about 65,400 outpatients and 31,740 inpatients yearly. In addition to an extensive approved internship and residency program, the Center offers organized instruction for nurses, laboratory and X-ray technicians, medical secretaries, and other health-related vocations.



Committees

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ALUMNI AND ALLIED ASSOCIATIONS

THE GENERAL ALUMNI ASSOCIATION

THE OBJECTIVES OF THIS ASSOCIATION are to unite graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the University and left the University in good standing, or any person who is or has been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those eligible members who are current contributors (dues or otherwise) to or life members of the George Washington University General Alumni Association, the Alumni Association of any school of the University, or contributors to the Annual Support Program.

The Alumni Office is in Alumni House, 714 Twenty-first Street, N.W., Washington, D.C. 20006. All alumni are urged to keep the Alumni Office informed of changes of address or occupation and to supply information with regard to their fellow alumni.

THE GEORGE WASHINGTON UNIVERSITY MEDICAL ALUMNI ASSOCIATION

The George Washington University Medical Alumni Association, incorporated in 1959, continues the organization previously known as the George Washington University Medical Society.

The stated purposes of the Association are as follows: "This shall be a non-profit organization international in scope, whose objectives shall be to provide constructive services for the M.D. degree alumni of the George Washington University School of Medicine and Health Sciences for furthering the art and science of medicine, research, and for the promotion of the welfare of the George Washington University School of Medicine and Health Sciences, its students, the George Washington University Hospital and its trainees."

Active membership in the Association consists of all M.D. degree graduates of the School of Medicine and Health Sciences; current members and, on application, past members of the teaching staff of the School of Medicine and Health Sciences, who hold doctoral degrees; Doctors of Medicine who have had two or more years of postgraduate training in the George Washington University Hospital. Junior membership consists of all members of the student body

the M.D. degree program of the School of Medicine and Health Sciences during the time they are students.

The Medical Alumni Association maintains an office in the School of Medicine and Health Sciences.

OFFICERS FOR 1973–74

President—Donald H. Glew, Jr., M.D. 1948
President Elect—John F. Mermel, M.D. 1960
First Vice President—Dee R. Parkinson, M.D. 1943
Second Vice President—Kent A. Peterson, B.A., 1956, M.D. 1959
Secretary—Carlos A. Silva, M.D. 1960
Treasurer—Harry C. Beaver, M.D. 1963
Council:
Jerome W. Canter, M.D. 1955
Walter F. Cresswell, Jr., M.D. 1948
Marvin P. Footer, B.A. 1938, M.D. 1942
Thomas H. Goodridge, M.D. 1965
Stanley M. Kirson, B.A., M.D. 1957
Sidney A. Levine, M.D. 1941
Samuel D. Loube, B.A. 1941, M.D. 1943
Frank N. Miller, Jr., B.S. 1943, M.D. 1948
Charles W. Thompson, M.D. 1941
Eric Wagshal, B.A. 1967, M.D. 1970

COURSES OF INSTRUCTION

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES serves other divisions of the University by making available to nonmedical students certain undergraduate and graduate courses in the following departments: Anatomy, Biochemistry, Epidemiology and Environmental Health, Microbiology, Pathology, Pharmacology, and Physiology. The courses listed are subject to some slight change. The University reserves the right to withdraw any course announced.



STAFF OF INSTRUCTION

The Staff of Instruction listed under each Department is for the academic year 1973–74.

EXPLANATION OF COURSE NUMBERS AND SYMBOLS

A number in parentheses after the name of the course indicates number of semester hours of credit which may be earned.

Courses numbered from 1 to 100 are for first- and second-year undergraduate students. Courses numbered from 101 to 200 are for third- and fourth-year undergraduate students. Courses in the basic science departments numbered from 201 to 400 are for candidates for the M.D. degree and graduate students in the Arts and Sciences. All other courses numbered from 201 to 400 are primarily for candidates for the M.D. degree.

KEY TO ABBREVIATIONS

The following abbreviations are used in this catalogue for course designations.

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anes	Anesthesiology
Anth	Anthropology
Art	Art
BAd	Business Administration
Bioc	Biochemistry
BiSc	Biological Sciences
CH&D	Child Health and Development
Chem	Chemistry
ClEn	Clinical Engineering
Derm	Dermatology
Econ	Economics
Engl	English
Epid	Epidemiology and Environmental Health
Geog	Geography and Regional Science
HCA	Health Care Administration
Hist	History
Hum	Experimental Humanities
Idis	Interdisciplinary Courses
M&PA	Medical and Public Affairs
Math	Mathematics
Med	Medicine
Micr	Microbiology
Mus	Music
Neur	Neurology
NSur	Neurological Surgery
Ob&G	Obstetrics and Gynecology
Opth	Ophthalmology
Orth	Orthopaedic Surgery
Otol	Otolaryngology
Path	Pathology
Pchi	Psychiatry and Behavioral Sciences
Phar	Pharmacology
Phil	Philosophy
Phyl	Physiology
Phys	Physics
PSc	Political Science
Psyc	Psychology
Rad	Radiology
Rel	Religion
Soc	Sociology
Sp&D	Speech and Drama
Stat	Statistics
Surg	Surgery
Urol	Urology

Anatomy

Chairman: R.S. Snell

Professors Paul Calabrisi *(Emeritus)*, C.M. Goss *(Visiting—Medical History)*, F.D. Allan, T.N. Johnson, R.S. Snell

Professorial Lecturers J.L. Angel, T.S. Reese

Associate Professors E.N. Albert, Marilyn Koering

Associate Clinical Professor R.N. Brown

Associate Professorial Lecturers J.A. Di Paolo, Joan Blanchette-Mackie, Kathleen Weston

Assistant Professors Ann Butler, D.E. Morse, M.D. Olson

Special Lecturer Mary Ericksen

115 **Anatomy for Anesthetists** (3) — Staff

For students in the Nurse Anesthetist Program. Offered off campus through the College of General Studies. Anatomical facts and concepts essential for safe administration of anesthetics; emphasis on anatomy of head and neck.

*201 **Anatomy** (10) — Staff

All anatomical disciplines are integrated: regional gross dissection, histology, neuroanatomy, embryology. (Fall)

202 **Gross Anatomy** (6) — Snell and Staff

For graduate students. Regional dissections of adult cadaver supplemented with lectures and X-rays. Laboratory fee, $30. (Fall)

203 **Human Embryology** (1) — Allan

For graduate students. Origin and development of human body; emphasis on value of embryology in interpreting anatomical anomalies. (Fall)

204 **Neuroanatomy** (2) — Johnson, Butler

For graduate students. Gross and microscopic anatomy of central nervous system and special senses. Students who have received credit for Anat 204 may not register for Anat 212. Laboratory fee, $13. (Fall)

205 **Human Microscopic Anatomy** (3) — Albert and Staff

(Formerly Microscopic Anatomy)

For graduate students. Microscopic structure of cells, tissues, and organs of the human body. Laboratory fee, $20. (Fall)

206 **Electron Microscopic Histochemistry** (3) — Albert

For graduate students. Experimental study of electron histochemical techniques. Prerequisite: Anat 205 or equivalent. Laboratory fee, $30. (Spring)

208 **Comparative Vertebrate Neurology** (1) — Butler, Johnson

For graduate students. Survey of the evolution of the vertebrate brain. Prerequisite: Anat 204. Laboratory fee, $10. (Spring)

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* Required for medical students.

209 **The Use of Audio-visual Techniques in Anatomy** (2) Allan

For graduate students. Preparation of a significant audio-visual program of some aspect of human anatomy. Laboratory fee, $20. (Spring)

210 **The Use of Computers in Anatomy** (2) Snell

For graduate students. Applying computer techniques to the problems of learning anatomy. Limited enrollment. Laboratory fee, $20. (Spring)

211 **Cell Biology** (2) Staff

For graduate students. Same as Idis 211 and Phyl 211. An integrated survey of the structure, function, and metabolism of the cell, as an introduction to the medical sciences.

212 **Neurobiology** (3) Staff

For graduate students. Same as Idis 212 and Phyl 212. An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstration, and laboratory. Laboratory fee, $25.

221–22 **Seminar** (1–1) Koering

For graduate students. Research reports and discussions of special topics by staff and graduate students. Medical students encouraged to attend. (Academic year)

249 **Introduction to Anatomical Research** (1) Staff

For graduate students. Major research techniques as applied to biological materials in the various anatomical disciplines. (Fall)

252 **Physical Anthropology** (1) Angel

Variations in man and factors affecting him, human evolution and racial differences, anatomy and culture of ancient man. (Spring)

254 **Fetal Anatomy** (2) Allan

Dissection of early and late human fetus. Comparison of fetal and adult structures. 20 students. Laboratory fee for nonmedical students, $10. (Spring)

256 **Human Genetics** (1) C.B. Jacobson

General principles of genetics, new cytogenetics techniques, aneuploidy in man and its significance, biochemical aspects of heredity, genetic counseling. (Spring)

258 **Cytology** (3) Albert and Staff

Detailed study of morphology and function of the cell and its organelles. Basic cytological techniques emphasized. Laboratory fee for nonmedical students, $20. (Spring)

260 **Electron Microscopy in Cellular Biology—Lecture** (1) Koering

Introduction to the morphology of the cell and its components. (Spring)

261 **Electron Microscopy in Cellular Biology—Laboratory** (2) Koering

Introduction to the routine processing of specimens; preparation and interpretation of micrographs. Limited enrollment. Admission by permission of instructor. Prerequisite or concurrent registration: Anat 260. Laboratory fee for nonmedical students, $15. (Spring)

262 **Gross Anatomy of Upper and Lower Extremities** (2) Snell and Staf
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

263 **Applied Anatomy of the Autonomic System** (5) Allan
Comprehensive study of the structure and function of the autonomic nervous system. 4-week elective periods.

264 **Gross Anatomy of Head and Neck** (2) Snell
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

265 **Clinical Cell Biology and Electron Microscopy** (5) Albert
Includes the investigation into definitive clinical problems with electron microscopy and other related cytological techniques. 4-week elective periods.

266 **Gross Anatomy of Thorax and Abdomen** (2) Snell
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

268 **Gross Anatomy of Pelvis, Perineum, and Lower Extremity** (2) Snell and Staf
Detailed dissection, supplemented by X-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

270 **Dissection of the Human Brain** (1) Johnson
Dissection of major pathways and nuclei of the brain with consideration of ventricular system; conferences and assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

272 **Autonomic Nervous System** (1) Allan
Development, microscopic and gross anatomy, function of central and peripheral components of autonomic nervous system. (Spring)

274 **Tissues of the Body** (1) Snell
Selected tissues of the human body considered in depth. (Spring)

276 **Advanced Studies in Anatomy** (1) Staff
Lectures and conferences on selected anatomical subspecialties—endocrinology, teratology, growth, etc. May be repeated for credit. (Spring)

279 **Applied Regional Anatomy** (5) Snell
Regional dissection, guided readings, weekly discussions. 4-week elective periods.

281 **Applied Anatomy of the Newborn** (5) Allan, Snell
The full-term fetus or neonatal infant examined by dissection or by study of pre-dissected specimens. 4-week elective periods.

282 **Advanced Neuroanatomy** (5) Johnson, Bullock
Dissection of the human brain, study of slides of the central nervous system, and an introduction to neurological research. 4-week elective periods.

284 **Applied Surface Anatomy and Radiology** (5) Snell

Detailed study of anatomical structures which are accessible to examination in the living subject; normal radiology of the body. 4-week elective periods.

285 **Application of Audio-visual Techniques to Anatomy** (5) Allan

Students identify, develop, and produce an audio-visual program on some aspect of human anatomy. 4-week elective periods.

287 **Human Cytogenetics** (10) C.B. Jacobson

Chromosomal research on reproductive anomalies, congenital malformations, mutagenic assay. Tissue culture, photomicrography, karyotypic analysis, genetic counseling. 8-week elective periods. Univ. Hosp.

288 **Surface Anatomy and Radiology** (1) Snell

Lectures and demonstrations on areas of clinical importance.

289 **Application of Computer Techniques to Anatomy** (5) Snell

A simple anatomical program devised to demonstrate the application of computer techniques to problems of learning anatomy. 4-week elective periods.

291 **Special Projects in Anatomy** (5) Snell

Independent study on any aspect of gross anatomy worked out between the student and the instructor. 4-week elective periods.

292 **Advanced Reproductive Endocrinology** (5) Koering

Study of structure and function of male and female reproductive organs; emphasis on correlating their activities with those of other endocrine glands. 4-week elective periods.

295 **Research** (arr.) Staff

Content differs each time course is offered; may be repeated once for credit. Fee to be arranged. (Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Anesthesiology

Chairman: C.S. Coakley

Professors C.S. Coakley, Seymour Alpert, B.S. Epstein, R.J. Van Houten
Associate Professors W.L. Marsh, Paula Kaiser, Marie-Louise Kennedy, G.A. Morales, Herbert Weintraub, R.E. Tobey, C.H. Klingenmaier
Associate Clinical Professor S.N. Albert

Assistant Professors Hildegard Manitsas, B.S. Dunbar, M.J. Shaffer, J.B. Craft Jr., J.E. Zimmerman, Alice Altstatt, K.J. Hassan, J.P. Swope, Maya Karna Mohammad Shahvari

Assistant Clinical Professors W.E. Bageant, Chalom Albert, Philip Lowenthal J.H.J. Brown, Brian McAlary, M.W. Lichtmann

Instructors Lilia Banzon, M.F. Gonzales

Clinical Instructors Nan-Huan Char, C.D. Lee, J.M. Kelley, W.A. Lell, M.H Rosenthal

Courses numbered 190 through 194 are for students in Nurse Anesthetist undergraduate programs.

190 **Seminar: Anesthesiology** (4) Staff

Small discussion groups with the teaching staff of the Department on morbidity and mortality from actual and/or reported cases. Topics related to complications of anesthesia.

191 **Respiratory Care** (3) Staff

Advanced techniques for the care of patients requiring total prolonged respiratory support.

192 **Orientation for Anesthesia** (3) Staff

Lecture, group discussion, and audio-visual presentation. Topics covered include history of anesthesia, legal aspects, ethics, psychology, professional adjustments, department management, and organization.

193 **Methods and Procedures in Anesthesia** (3) Staff

Lecture, group discussion, and audio-visual presentation. Topics covered include anesthesia techniques, positions in anesthesia, types of anesthetic required to meet the needs of different surgical specialties, and related topics.

194 **Principles of Clinical Anesthesia** (3) Staff

At affiliated hospitals. Programmed supervised clinical training and experience. The student is assigned patients, organizes and administers anesthesia, and follows the patients through their total hospitalization. Designed to satisfy the American Association of Nurse Anesthetists requirements. Course is repeated for credit for 3 semesters, for a total of semester hours. Staff

*302 **Clinical Clerkship**

Clinical preoperative evaluation, surgical and obstetrical anesthesia, infant and adult resuscitation, inhalation therapy, management of patients in coma, shock, and other problems which may be encountered in medical practice. 1 week—Univ. Hosp., 1 week—Nat'l. Naval Med. Center or Walter Reed Gen. Hosp. (2-week periods throughout academic year) Weintraub

380 **Anesthesiology** (5)

Clinical experience in preoperative evaluation, surgical and obstetrical anesthesia, infant and adult resuscitation, inhalation therapy; monitoring and blood gas determinations. 4-week elective periods. Univ. Hosp.

384 **Intensive Care Unit** (5) Klingenmaier, Dunbar, Zimmerman

Evaluation and management of respiratory failure, rationale and use of

* Required for medical students. Part of Med 308. Credit assigned after completion of Med 308

automatic ventilators, chronic airway management, cardiovascular support, and intensive care. 4-week elective periods. Univ. Hosp.

386 **Intensive Care Unit** (5) **Rosenthal**

Evaluation and management of respiratory failure, rationale and use of automatic ventilators, airway management, cardiovascular support techniques, and intensive care medicine. 4-week elective periods. Nat'l. Naval Med. Center

390 **Extramural Anesthesiology Elective** (ART.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact Dr. Herbert Weintraub.

Biochemistry

Chairman: C.R. Treadwell

Professors C.R. Treadwell, B.W. Smith, G.V. Vahouny, J.M. Bailey, Helen Hess
Professorial Lecturers W.W. Burr, Jr. *(Isotopes)*, Edward Steers, Jr., W.F. Anderson *(Genetics)*, Gordon Guroff, A.N. Schechter, Steven Levisohn
Assistant Professors G.A. Walker, Linda Gallo *(Research)*, G.D. Maier *(Visiting)*
Lecturer P.H. Fishman
Special Lecturer J.C. Smith, Jr.

*201 **Medical Biochemistry** (8) **Staff**

Lectures and laboratory; emphasis on basic principles and their relation to medicine. (Fall)

221–22 **General Biochemistry** (2 or 4–4 or 5) Vahouny, Gallo, and Staff

Lecture and laboratory. A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Graduate students *must* register for both lecture and laboratory: Bioc 221, 4 semester hours; Bioc 222, 5 semester hours. With specific recommendation by the undergraduate adviser and the Department, undergraduate students may register for the lecture portion only: Bioc 221, 2 semester hours, Bioc 222, 4 semester hours. Prerequisite: Chem 152, 154. Material fee (graduate students only), $20 a semester. (Academic year)

224 **Biochemistry of Enzymes** (1)

Biochemistry of enzymes and enzyme reactions. Prerequisite: Bioc 201 or 221. (Fall)

225 **Biochemistry Procedures** (3) B. Smith and Staff

Laboratory course. Material fee for nonmedical students, $16. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

* Required for medical students.

227 **Biochemistry Seminar** (1) Staf

Current literature in biochemistry, mainly for graduate students, but open to limited number of specially qualified medical students. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

232 **Proteins and Amino Acids I** (1) Steers

Prerequisite: Bioc 201 or 221. (Fall)

233 **Proteins and Amino Acids II** (1) Steers, Schechter

Continuation of Bioc 232. Methods for the study of protein confirmation, determination of active sites of enzymes; mechanisms of reactions at the active site. (Spring)

241 **Isotopes** (3) Burr

Theoretical characterization of isotopes and their applications in biology and medicine. Attention given to counting, health physics and radiation safety, autoradiography, chromatography. Laboratory fee for nonmedical students, $16. (Spring)

251 **Carbohydrate Metabolism** (1)

Prerequisite: Bioc 201 or 222. (Spring 1976 and alternate springs)

252 **Biochemistry of the Brain** (1) Maloof

For medical students; open to limited number of graduate students. Recent biochemical developments in structure, functions, and metabolic processes unique to the brain. (Spring)

254 **Human Nutrition** (1)

For medical students; open to limited number of graduate students. Application of nutritional principles in humans. (Spring)

256 **Biochemistry of Organ Function** (1) N. Kramer

For medical students; open to limited number of graduate students. Emphasis on biochemical processes unique to particular organ systems; application of these processes to evaluation of function. (Spring)

258 **Inherited Metabolic Diseases** (1) Levisohn

For medical students; open to limited number of graduate students. Contribution of molecular biology to understanding of human mutations and hereditary diseases. Specific disease states and genetics of protein structure discussed. Prerequisite: Bioc 201 or 221. (Spring)

260 **Biochemistry of the Steroids** (1) O. Dodek

For medical students; open to limited number of graduate students. Basic chemistry of the steroids, pathways of biosynthesis and metabolism, regulatory mechanisms, physiologic effects, clinical measurement of endogenous steroids, clinical manifestations of steroid imbalance, steroid changes in pregnancy, and steroid therapy. (Spring)

262 **Biochemistry of the Lipids** (1) Vahouny

Discussion of topics of current interest, including digestion, energy production, biosynthesis, function in specialized tissues and subcellular particles. Content differs each time course is offered; may be repeated for credit. (Spring)

266 **Biochemical Genetics** (1) — Anderson

For medical students; open to limited number of graduate students. (Spring)

268 **Biochemistry of Bone and Muscle** (1) — Walker

Study of structure, chemistry, and biochemistry as they relate to the normal and diseased states of bone and muscle; emphasis on current theories and techniques. (Spring)

279 **Research in Renal Function, Mutarotase, and Sugar Transport** (10) — Bailey

Clinical significance of plasma mutarotase levels in kidney disease. 8-week elective periods.

280 **Research in Experimental Atherosclerosis** (10) — Bailey

Study of factors influencing the development and course of atherosclerosis in rabbits. 8-week elective periods.

281 **Research in Biochemistry of Carbohydrates and Enzymes** (10) — B. Smith

Research in a problem already under investigation in the Department or a project in related fields suggested by the student. 8-week elective periods.

282 **Research in Biochemistry of Lipid Metabolism and Transport** (10) — Vahouny

Biochemical investigation of a clinical problem involving lipids of special interest to the student, or participation in existing research program in the Department. 8-week elective periods.

283 **Research in Metabolic Regulation within the Heart** (10) — Vahouny

Studies on metabolic regulation and effects of drugs. 8-week elective periods.

286 **Research on Transfer RNA and Protein Biosynthesis in Normal and Tumor Cells** (10) — R.C. Gallo*

Investigative work on isolation and purification of RNA fractions and function in protein synthesis in cell-free systems from normal and tumor cells. 8-week elective periods. National Cancer Institute, NIH.

287 **Research on the Function of B_{12} Coenzymes in Cell Replication** (10) — Walker

Research in a problem under investigation in the Department. 8-week elective periods.

288 **LDH Viruses in Immunosuppression** (10) — Bailey

Changes in plasma enzyme clearance and cellular immune mechanisms in LDH virus infection. 8-week elective periods.

290 **Extramural Biochemistry Elective** (arr.) — Staff

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

* Dr Gallo is Senior Investigator at the National Cancer Institute.

295 **Research in Biochemistry** (arr.)

For 1st- and 2nd-year medical students and for graduate students. Participation in a project under investigation in the Department or one in a related field suggested by the student and approved by the Staff. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Child Health and Development

Chairman: R.H. Parrott

Associate Chairmen: F.C. Green *(Child Health Advocacy)*, D.W. Delaney *(House Staff and Medical Care)*, J.C. Houck *(Research)*, A.M. Margileth *(Student Affairs)*, J.G. Randolph *(Surgical Division)*

Directors of Divisions: B.S. Epstein *(Anesthesiology)*, F.C. Green *(Child Health Advocacy)*, Gordon Avery *(Neonatology)*, M.J. Malone *(Neurology and Neurosurgery)*, M.M. Parks *(Ophthalmology)*, D.W. McKay *(Orthopaedics)*, B.M. Webb *(Otolaryngology)*, D.W. Delaney *(Pediatric Medicine)*, Gloria Eng *(Physical Medicine and Rehabilitation)*, R.S. Lourie *(Psychiatry)*, W.J. McSweeney *(Radiology)*, J.G. Randolph *(Surgery)*

Professors R.S. Higdon, J.P. Adams, R.S. Lourie, J.G. Randolph, R.H. Parrott, Spyros Doxiadis *(Visiting)*, S.L. Leikin, J.C. Houck *(Biochemistry)*, A.M. Margileth, M.J. Malone, B.S. Epstein, Gordon Avery, D.W. Delaney, Wellington Hung, L.P. Scott III, R.M. Chanock, D.W. McKay, J.E. McClenathan, W.J. McSweeney, F.C. Green

Clinical Professors W.S. Anderson, L.E. Hoeck, W.A. Howard, Sidney Berman, Sydney Ross, William Stark, M.M. Parks, J.D. Noshpitz, Morris Fettel, Leon Cytryn, Jeanne Spurlock

Professorial Lecturers R.B. Scott, Melvin Jenkins

Associate Professors Margaret Gutelius, Rebecca Rieger *(Research)*, L.W. Perry, H.B. Richardson, Jr., Gloria Eng, Mervyn Elgart, Ann Barnet, T.H. Mitchorat, Massoud Majd, Nasser Movassaghi, D.W. Bailey, M.N. Ozer *(Research)*, J.R. Puig, Constance Battle, J.C.M. Chan, D.J. Fishman

Associate Clinical Professors J.J. McFarland, Jr., S.I. Wolf, A.B. Coleman, Bennett Olshaker, Belinda Straight *(Psychiatry)*, G.J. Cohen, J.J. Frances, A.F. North, Jr., Iradj Mahdavi, Isabella Bourne, A.J. Modlin, P.C. Brunschwyler, Max Fischer, P.F. Wohlford, H.T. Yates, B.H. Ong, H.R. Gold, J.L. Chamberlain III, Karin Nelson

Assistant Professors C.A. Rigg, G.P. August, C.D. Brandt *(Microbiology)*, H.W. Kim, Anne Fletcher, Jane Todaro, R.P. Altman, D.S. Friendly, Jocelyn Hicks,

Karen Olness, M.M. Platt, Carolyn Robinowitz, J.H. Wise, K.J. Hassan, H.A. Mangold, W.S. McCurley, Beneta Peacock, D.A. Davis *(Research)*, Annette Heiser, D.L. Breckbill, S.R. Shapiro, Elaine Esber, R.A. Cahill, R.E. Johnsonbaugh, L.W. Greenberg, Maya Karna, Kathryn Anderson

Assistant Clinical Professors J.L. Levine, I.D. Milowe, J.H. Peacock, Jr., H.G. Clark, Stephen Mourat, Erwin Friedman, M.S. Glatt, A.E. Marans, Elma Denham, D.H. McKnew, Jr., L.A. Cove, Milton Engel, Mary Fox, V.L. Guandolo, Leonard Lefkowitz, J.G. Chopra, S.G. Werner, A.B. Zients, G.W. Hardman, Jr., G.A. Balfour, D.G. Albert, B.M. Webb, Virginia Ingram, G.W. Mella, G.A. Tripp, Michael Brody, J.L. Hatleberg, K.L. Kaplan, Robert Shearin, Eduardo Azcarate *(Psychology)*, F.A. Pedreira, Thomas Sullivan, Lovisa Tatnall, Edith Taylor, Stanley Greenspan, Richard Evans III, Sylvia Wooten, Christina Kimball, Jocelyn Malkin, D.M. Cathro, D.R. Meers, B.A. Shaver, Cynthia Miller, Marilyn Renfield, Barry Landau, A.H. Stein, Elvin Mackey, Jr., P.T. Peebles, Miryam Davis

Assistant Professorial Lecturer I.P. Weiss

Instructors Ramesh Desai *(Research)*, Khawla Al-Abbousi, Lilia Banzon, Gretchen Collins, Maureen Edwards, M.D. Smokvina, G.H. Sunshine, J.C. Srabstein, Judith Fallon

Clinical Instructors H.H. Diamond, Emilie Black, Hilary Millar *(Psychiatry)*, Harold Plotsky, D.A. Young, George Joseph, M.L. Feldman, Manouchehr Rokni, H.J. Steinfeld, B.S. Bruner, M.E. Lederman, M.E. Bravo, G.W. Daisley, Jr., K.G. Kassebaum, Agnes Schweitzer, Sirus Amiri, Viola Cheng, Vichitur Chusuei, Thomas Frey, M.J. Guralnick *(Psychology)*, Annop Tantisunthorn, J.M. Burgin, R.H. Schwartz, Cecilin Chisholm, Mario Ortega, M.W. Datch, F.L. Stroud, H.S. Williams, Lillian Beard, M.J. Cavanaugh, T.M. Connor, S.C. Goyal, H.L. Kaftarian, R.P. Dickey, J.A. Lowe, F.J. Crosson, Jr., R.R. Cioletti, A.R. Ugel, M.G. Walten, Jr.

Special Lecturers J.A. Bottiglione, C.J. Schulte III, J.W. Oberman, E.V. Soto, R.F. Hinckley, Susan Fisher, C.M. Berlin, Jr., M.I. Mones, R.S. Chandra, Lucas Kulczycki, Marianne Schuelein, J.A. Kenney, Jr., M.I. Michael, B.J. Walsh, J.L. Sever, Paul Hamosh, Ira Seiler

*303 **Pediatric Clerkship** (10) — Margileth

Full-time, as part of resident team; ward rounds; work in outpatient department and specialty clinics under staff supervision; child psychiatry and child guidance, lectures, clinical conferences, grand rounds. Children's Hosp. (Annual, continuous 8-week rotation)

374 **Mental Retardation** (5 or 10) — Cytryn

Diagnostic work-up of mentally retarded children and adolescents. Conferences, community resources. 4- or 8-week elective periods.

376 **Pediatric Neurology** (5 or 10) — Malone, Platt

Participation in diagnostic and therapeutic studies on inpatients and outpatients. Rounds, conferences, seminars. 4- or 8-week elective periods. Children's Hosp.

377 **Community Health Development** (5 or 10) — Hinckley

Acquaintance with public health preventive and community medicine as it is conducted by the Montgomery County, Md., Health Department. Op-

*Required for medical students.

portunity to work in outlying health center satellites and central pediatri specialty clinics and to become familiar with school health programs an projects. 4- or 8-week elective periods.

378 **Nutrition** (5) Todar

Therapeutic nutrition and nutritional content of foods taught in a variet of clinical circumstances. Rounds and tutorials with chief dietitian; we and sick baby clinic, adolescent clinic, and newborn nursery. 4-week ele tive periods. Children's Hosp.

379 **Child Development—Community Applications** (5) Ozer, Bear

Application of child development principles in young school-age children The course is provided by the staff of Program for Learning Studies, an the program is carried out in elementary schools, special education facili ties, and hospital clinics. 4-week elective periods.

380 **Clinical Pediatrics** (5) Margileth, Puig

Full-time, as part of resident team; wards, outpatient department, and spe cialty and emergency clinics under staff supervision. Participation in diag nostic studies, therapeutic procedures, rounds, and conferences. Acting in ternships are available. 4-week elective periods. Children's Hosp.

381 **Pediatric Allergy** (5 or 10) Howard

Introduction to pediatric allergy, clinics and wards, some experience in ex perimental techniques and preparation of extracts. 4- or 8-week elective periods. Children's Hosp.

382 **Pediatric Radiology** (5) McSweeney

Diagnostic and therapeutic radiology in infants and children; special diag nostic procedures. 4-week elective periods. Children's Hosp.

383 **Cystic Fibrosis** (5) Kulczycki

Detailed diagnostic and therapeutic procedures including pulmonary and nutritional manifestations and complications as seen in cystic fibrosis pa tients, from the newborn to those in their third decade. Medical, sur gical, psychological, and social problems of cystic fibrosis patients and their families. 4-week elective periods. Children's Hosp.

384 **Newborn and Premature** (5) Srabstein

Principles and practices of neonatology emphasizing basic physiological processing; their relationship to normal development and to diseases in the newborn period. 4-week elective periods. Univ. Hosp.

385 **Child Psychiatry** (5) Webster

Observation of and appropriate participation in diagnostic, consultative, and follow-up work with hospitalized children and psychiatric outpatients. Clinical and theoretical conferences. Orientation to community child psy chiatry and child mental health as part of service delivery system. 4-week elective periods.

386 **Pediatric Hematology** (5) Leikin

Clinical and laboratory studies of infants and children with hematologic disorders; bone marrow examinations. 4-week elective periods. Children's Hosp.

387 **Clinical Pediatrics** (5) — Soto

Care of newborn and children on inpatient basis; diagnostic studies, therapy; assigned reading. 4-week elective periods. Fairfax Hosp.

388 **Newborn Medicine** (5) — Avery, Fletcher

Observation and participation in the care of infants. 4-week elective periods. Children's Hosp.

389 **Pediatric Cardiology** (5) — L. Scott, Perry

Physical diagnosis of congenital and acquired heart diseases, interpretation of electrocardiograms and vectorcardiograms, cardiac catheterizations. 4-week elective periods. Children's Hosp.

390 **Extramural Pediatric Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact Dr. Andrew Margileth.

391 **Cell Biology Research** (5 or 10) — Houck

Biochemical studies of normal and diseased human cells in culture. 4- or 8-week elective periods. Children's Hosp.

392 **Adolescent Medicine Clerkship** (5 or 10) — Rigg

Study of the normal developmental problems of adolescence. Experience in the medical care of adolescents with consultative and teaching conferences. 4- or 8-week elective periods. Children's Hosp.

393 **Pediatric Anatomical Pathology and/or Clinical Pathology** (5) — Hicks, Chandra

Participation in necropsy and surgical pathology service. Clinical correlation of histopathology, laboratory studies, and clinical disease. 4-week elective periods. Children's Hosp.

394 **Pediatric Clinical Laboratory** (5) — Hicks, Margileth

Laboratory studies of infants and children correlated with clinical disease. In-depth review of laboratory diagnostic studies. 4-week elective periods. Children's Hosp.

395 **Endocrinology** (5) — Hung, August

Evaluation of patients with metabolic and endocrine disorders. Planning of diagnostic and therapeutic programs of patients in an office setting and possibly inpatients. 4-week elective periods. Children's Hosp.

396 **The Handicapped Child and Chronic Disease** (5) — Battle

An approach to the care of the handicapped child, in a clinical situation and through tutorial readings. 4-week elective periods. Hosp. for Sick Children

397 **Nephrology** (5) — Chan

Training in clinical nephrology and hemodialysis; research opportunities in Vitamin D metabolism, acid-base physiology, intravenous nutrition, renal physiology, and calcium metabolism. 4-week elective periods. Children's Hosp.

398 **Comprehensive Care** (5 or 10) — Oberman

Participating in both sick- and well-child care as administered in a comprehensive setting; experience in multidisciplinary approach; cooperative plan-

ning with other community agencies. 4- or 8-week elective periods. Com
prehensive Health Care Program

399 **Community Pediatrics** (5) Greenber

For students primarily interested in the private practice of pediatrics. Ca
in the nursery and pediatric ward of a community hospital; exposure t
private practice of pediatrics in an office setting. 4-week elective period
Holy Cross Hosp.

Clinical Engineering

Chairman: W.S. Yamamoto

Professors W.S. Yamamoto, H.V. Pipberger, R.D. Squires
Professorial Lecturer Bernard Kemp
Associate Professor J.C. Aller *(Research)*
Associate Professorial Lecturer G.B. Devey
Assistant Professors C.D. Batchlor *(Research)*, Alan Berson *(Research)*, Rosalie
Dunn *(Research)*, Hanna Pipberger *(Research)*, U.E. Ruttiman, F.H. Orthner,
P.R. Moyer
Assistant Clinical Professor H.A. Haessler

Staff

101 **Practical Computing for Paramedics** (3)

For students in the Radiologic Science and Administration degree pro
gram. Designed to familiarize the student with a computer system.

Staff

351 **Medical Engineering for Medical Students** (5)

Students will be assigned to a biomedical engineer for tutorial instruction
in the principles and practices of clinical engineering. Participation in cu
rent laboratory projects, assigned reading and study. Participation in the
Health Care Technology Seminar is required during the period of the elec
tive. Students should have some basic knowledge of mathematics or phys
ics, or some prior exposure to engineering disciplines. Consultation with
the staff is required prior to enrollment. 4-week elective periods. War
wick Bldg.

Staff

353 **Medical Computing** (5 or 10)

Aspects of computer usage including the preparation and execution of pro
grams which involve clinical or research applications, such as ECG analy
sis, pulmonary function calculation, medical file management, mathemat
cal modeling, data processing, and managerial computing. In some cases
the staff may be able to supervise a student in an area of his choice, in
general, however, the program will consist of formal classroom instruction
as well as individual study. Participation in the Health Care Technology
Seminar is required during the period of the elective. 4- or 8-week elective
periods (may be taken in two divided 4-week periods). Warwick Bldg.

Staff

354 **Automated Medical Measurement Systems** (5)

Under supervision, the student will work in the daily operation of a multi
phasic screening clinic and participate in the process of new implementa
tions and in evaluation of the system. Review of variability of clinical
findings and the problems of the variability of clinical observation. Partici

pation in the Health Care Technology Seminar is required during the period of the elective. 4-week elective periods. Warwick Bldg.

390 **Extramural Clinical Engineering Elective** (arr.) Staff

The Department arranges for students to spend one or more elective periods at other institutions. Interested students must have the approval of the Chairman of the Department.

Dermatology

Chairman: R.S. Higdon

Professor R.S. Higdon
Associate Professor Mervyn Elgart
Associate Clinical Professors W.M. Narva, George Skipworth
Assistant Clinical Professors C.S. Brown, Manuel Landman, P.L. Repetto, Jr., Donald Mitchell, L.J. Eanet, Maria Turner, T.P. Nigra
Clinical Instructors H.S. Golomb, R.N. DeAngelis, D.L. Pierson, D.N. Robins, A.R. Ugel
Special Lecturers Naomi Kanof, J.A. Kenney, Jr., Zenona Mally

380 **Dermatology Clinic** (5) Skipworth

Conferences, lectures, and attendance at dermatology clinic where patients with wide variety of dermatoses are seen. Diagnosis and treatment of common skin disorders. Dermatologic surgical procedures, technique for using liquid nitrogen, culture and identification of fungi, microscopic diagnosis of common cutaneous diseases. 4-week elective periods. Walter Reed Gen. Hosp.

381 **Dermatology Clinic** (5)

Same as Derm 380. 4-week elective periods. Andrews Air Force Base Hosp.

382 **Dermatology Clinic** (5) Higdon

Same as Derm 380. 4-week elective periods. Univ. Clinic

383 **Dermatology Clinic** (5) Narva

Same as Derm 380. 4-week elective periods. Nat'l. Naval Medical Center

384 **Private Office Practice** (5) Repetto

4-week elective periods.

385 **Private Office Practice** (5) Eanet

4-week elective periods.

386 **Dermatology Clinic** (5) Mitchell

Same as Derm 380. 4-week elective periods. Group Health Asso., Inc.

387 **Clinical Dermatology** (5) Fischman*

Introduction to clinical dermatology. Working in the out-patient derma-

* Dr. Fischman is Chief of the Dermatology Service at the Veterans Administration Hospital.

tology clinic, observing in-patient consultations, reviewing histopatholog performing skin biopsies. Close supervision by staff. Interview require 4-week elective periods. VA Hosp.

388 **Dermatology in General Medicine** (5) Nigr

Dermatology as related to internal medicine. Mechanisms of diseases; in depth approach to dermatologic-medical problems; advanced readin 4-week elective periods. Wash. Hosp. Center.

390 **Extramural Dermatology Elective** (arr.)

The Department arranges for students to spend elective periods at othe institutions. Interested students should contact the Chairman of the De partment.

Epidemiology and Environmental Health

Chairman: J.W. Millar

Professor J.W. Millar
Professorial Lecturer J.E. Banta
Associate Professor C.R. Hartman
Associate Clinical Professors W.J. Zukel, L.S. Jaffe
Associate Professorial Lecturers C.E. Alexander, Jr., H.A. Bradford
Assistant Professors E.N. Kassira, Yousef Al-Doory
Assistant Clinical Professors Lawrence Pyle, Jr., John Vinyard, Jr.
Assistant Professorial Lecturers N.E. Manos, J.A. Lee, Olga Joly, D.V. Lassite Elizabeth Force, F.L. Hurley *(Biostatistics)*, Arlene Fonaroff, J.T. Dalto E.J. Ross
Clinical Instructor J.S. Sullivan
Special Lecturers W.R. Chiarulli, M.K. Howell, Jr., J.S.M. Dimapilis, R.G Stevenson, Jr., E.M. Strehlau, Ronald Wynn

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Courses numbered from 10 through 96 are limited to military personnel in the Medical Service Technology Program.

Staff

10 **Anatomy and Physiology** (2)

Study of the human body: esteology, arthrology, myology, hematology immunology; circulatory, respiratory, digestive, endocrine, excretory, ne vous, and reproductive systems.

Staff

11 **Applied Anatomy and Physiology** (6)

Application of anatomical and physiological principles. Control of hem orrhage, methods of resuscitation, management of shock, relief of pain physical examination, nutrition, fluid and electrolyte balance, respirator conditions, childbirth.

Staff

15 **Pharmacology and Toxicology** (5)

Study of medicinal substances used in the treatment of man: pharmaceu tical mathematics, terminology, preparations, compounding, physiologica action and potential toxic reactions of certain drugs, legal aspects of dru regulations.

16 **Clinical Laboratory Techniques and Procedures** (2) Staff

Study of certain laboratory procedures used in basic health maintenance. Use of microscope, complete blood count, acid-fast stain, urinalysis, blood sedimentation rate, RPR card test, coagulation and bleeding time, blood grouping, blood typing.

22 **Introduction to Epidemiology** (2) Staff

Study of common communicable diseases, immunologic factors and procedures. Contact interviewing and reporting of the communicable diseases.

67 **Disaster Sanitation** (2) Staff

Survey of nuclear, biological, and chemical hazards; emphasis on detection, personnel protection, and related functions.

68 **Environmental Sanitation** (3) Staff

Study of certain environmental factors which contribute to man's health. Food, water, living and working spaces, economics, and pest control.

92 **Medical Material Management** (5) Staff

Study of the management of material in the medical facility. Budget and budgeting process, expense operating budget, purchasing, material receipt and inspection, inventory of equipment and supplies, controlled medicinals, stock record cards, surveys and adjustments, classes of plant property, property accountability, storage requirements.

93 **Health Systems Administration I** (4) Staff

Study of health systems organization. General office procedures, basic typing methods, standard subject identification codes, filing procedures, records disposal, security of patient information, correspondence, procedural manuals.

94 **Health Systems Administration II** (4) Staff

Study of planning procedures in a health system. Planning of office systems and procedures, office environment and location planning, office quality control, work measurement methods, authority and organizational relationships, principles of office organization, employee supervision.

95 **Records Management** (6) Staff

Study of public health records management. Classification of personnel, personnel records, promotions, educational services, career development, personnel orientation, medical care eligibility, patient data systems, statistical analysis.

96 **Clinical Experience: Medical Service Technology** (6) Staff

Supervised experience and research involving the application of principles learned in didactic experience to the practical situation.

Courses numbered 101 through 192 are for students in the undergraduate program in Environmental Health.

101 **Environmental Sanitary Science I** (2) Staff

Water: general characteristics (urban and rural), treatment and distribution, public bathing place sanitation, design and function of water treatment facilities. (Spring)

102 **Environmental Sanitary Science II** (2) Staff
Recognition and control of environmental pollution. Treatment and disposal of human wastes—excreta, refuse, and air. (Spring)

103 **Environmental Sanitary Science III** (2) Staff
Dairy products and food sanitation; processing, storage, and distribution of food. Supervision and training of personnel involved with food and the food industry. (Spring)

104 **Environmental Sanitary Science IV** (2) Staff
Housing, urban and institutional; heating, ventilation, lighting, and noise. Study of federal and municipal regulatory aspects. (Spring)

105 **Air Pollution Abatement** (2) Staff
Association of air pollution and disease and the effects of major pollutants on man. Air measurement and air measurement techniques demonstrated. (Spring)

106 **Environmental Science of Nosocomial Infection** (1) Staff
Developing a surveillance protocol for nosocomial infection. Microbiological assay of the animate and inanimate components of the hospital environment. (Spring)

121 **Environmental Biostatistics** (2) Staff
Statistical reasoning, collection of data, rates, incidence, and prevalence. Generalization of observations and use of measurement data. (Spring)

122 **Environmental Epidemiology I** (2) Staff
Infectious diseases: bacterial, viral, rickettsial, protozoal, and helminthic. (Spring)

123 **Environmental Epidemiology II** (2) Staff
Zoonoses, deficiency diseases, chronic disease, pneumoconioses, mental health, maternal and child health. (Spring)

131 **Environmental Epidemiology III** (1) Staff
Venereal disease: etiology, clinical manifestations, diagnosis; prevention and control of syphilis, gonorrhea, chancroid, granuloma inquinale, and LGV. (Spring)

141 **Public Health Entomology I** (2) Staff
How the arthropods affect man. Study of host-parasite vector relationships; principles of systematic biology and basic insect taxonomy and toxicology. (Spring)

142 **Public Health Entomology II** (2) Staff
Identification, life cycles, and bionomics of medically important insects and other arthropods. (Spring)

143 **Public Health Entomology III** (1) Staff
Study of chemical, biological, and mechanical control of all medically important arthropods. (Spring)

144 **Public Health Entomology IV** (1) Staff
Prevention and control of rodent infestation; identification, habits, and relationship to man. (Spring)

151 **Public Health Microbiology I** (3) — Staff

Medical parasitology, protozoology (intestinal), the Haemosporidia (malaria), the Haemoflagellates and the metazoa (helminths) of medical importance. (Spring)

152 **Public Health Microbiology II** (2) — Staff

Clinical bacteriology, characteristics and identification of the bacteria involved in disease, study of rickettsia and viruses. (Spring)

153 **Public Health Microbiology III** (2) — Staff

Study and identification of the flora of water, dairy products, food, and the atmosphere. (Spring)

154 **Public Health Microbiology IV** (1) — Staff

Mycology: study of medically important fungi, systematic mycoses and dermatomycoses. (Spring)

171 **Industrial Hygiene I** (2) — Staff

Chemical hazards: study of diseases from chemical exposure, toxic dusts, metal fumes and vapors, gases, and organic compounds. (Spring)

172 **Industrial Hygiene II** (2) — Staff

Physical hazards: biological effects of low and high temperatures, radiation (electromagnetic, ultraviolet, ionizing), illumination, sound, pressure, and atmospheric pollution. (Spring)

180 **Practicum in Environmental Health** (12)

Supervised field experiences in environmental health: food service, housing, water, sewage and solid waste, and infectious diseases; occupational health problems; reports and conferences. Admission by permission of Department Chairman.

191 **Public Health Administration I** (1 to 3) — Staff

Activities and organization: philosophy, background, and development. Public health activities include vital statistics, laboratory services, education, nursing, and social services. (Spring)

192 **Public Health Administration II** (1 to 3) — Staff

Administrative considerations, including governmental aspects, legal considerations, fiscal management, personnel factors, and public relations in public health organizations. Prerequisite: Epid 191. (Spring)

*201 **Introduction to Epidemiology and Environmental Health** (2) — Millar and Staff

Open to qualified graduate students. Principles and methodology of epidemiology and biostatistics. Ecological approach to health and disease, including parasitology and mycology. (Spring)

217 **Clinical Mycology** (2 or 4) — Al-Doory

Study of clinical aspects of mycotic diseases; emphasis on diagnosis of disease and identification of etiologic agents. (Fall)

218 **Medical Parasitology** (1 or 2) — Millar and Staff

For medical students; open to qualified graduate students. Study of host-

* Required for medical students.

parasite relationships. Clinical recognition of the important parasites in medicine. (Fall)

219 **Malariology** (1) Kassira and Staff

The general principles of the diagnosis, life cycle, pathogenicity, treatment, and prevention of malaria. Prerequisite: Epid 201 or equivalent. (Fall)

230 **Biostatistics** (2 or 4) Staff

Introduction to statistical analysis, theory of measurements and distribution, including significance testing, basic concepts of probability and association, sampling techniques, design of experiments, and introduction to computers. (Fall and spring)

241 **Digital Computer Programming with Health Sciences Applications** (3) Staff

Use of digital computers in medicine, related health sciences, and other computational work. Writing, debugging, and running programs on the digital computer. (Fall and spring)

295 **Research in Epidemiology** (arr.) Staff

Participation in experimental studies in infectious diseases and research in community medicine. Admission by permission of Department. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

301 **Applied Epidemiology** (3) Staff

Lectures, seminars, and case studies. Epidemiological solutions to health problems of the community. (Fall and spring)

351 **Global Epidemiology** (1) Staff

For medical students; open to graduate students by arrangement. Geographic pathology of disease and international aspects of disease prevention and control, including world demographic problems. (Fall)

352 **Seminar: Experimental Epidemiology** (2) Hurley

For medical students; open to graduate students by arrangement. Student participation in definitions, design, and methods for developing epidemiologic studies of diseases. Prerequisite: Epid 230 or permission of instructor. (Fall)

353 **Military Preventive Medicine** (1) Staff

Operational medicine, environmental and sanitation problems, epidemiologic diseases of military importance and their prevention and control. Medical aspects of aerospace and submarine medicine. (Fall)

354 **Seminar: Human Ecology** (1) Lee and Staff

Ecology—man within the framework of reference—physical and cultural anthropology, geography, sociology, urban planning, public health, and public administration. (Fall)

356 **Introduction to Environmental Health** (3) Jaffe, Millar

A survey of organizations, function, current practices, and federal, state, and local regulations to control the environment. (Spring)

380 **Methods in Public Health** (5 or 10) **Staff**

Rotation through all divisions, including mental health, maternal and child health, environmental medicine, communicable diseases; field trips. 4- or 8-week elective periods. D.C. Dept. of Human Resources

382 **Clinical Practice of Public Health** (10) **Staff**

Application of ecological approach to problems of community health; emphasis on comprehensive care. Field experiences on such current issues as drug abuse, family planning, specific health needs of the aged, and other problems affecting delivery care systems. 8-week elective periods. D.C. Dept. of Human Resources

384 **Research in Public Health** (10) **Staff**

Supervised research; the student selects the topic from a broad range of public health problems, including mental health, maternal and child health, environmental medicine, epidemiological methods, biostatistics. 8-week elective periods. D.C. Dept. of Human Resources

385 **Studies in Cardiovascular Disease** (5) **Zukel**

Participation in one or more current studies at the National Heart and Lung Institute; selection by the student. 4-week elective periods.

387 **Diseases of the Tropics** (5 or 10) **Staff**

Diagnosis, treatment, epidemiology, and laboratory aspects of exotic diseases; experience in the delivery of health care in the tropics. 4- or 8-week elective periods.

390 **Extramural Epidemiology Elective** (arr.)

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

398 **Advanced Reading and Research** (arr.) **Staff**

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Interdisciplinary Courses

FIRST-YEAR MEDICAL STUDENTS are required to take two interdisciplinary courses: Idis 211 *Cell Biology*, administered by the departments of Anatomy, Biochemistry, and Physiology; and Idis 212 *Neurobiology*, administered by the departments of Anatomy and Physiology.

211 **Cell Biology** (2) **Staff**

Same as Anat 211 and Phyl 211. An integrated survey of the structure, function, and metabolism of the cell, as an introduction to the medical sciences.

212 **Neurobiology** (3) Staff

Same as Anat 212 and Phyl 212. An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstration and laboratory.

Clinical Sciences, an interdisciplinary program, is required of medical students in the second year. By means of panel discussions, lectures, seminars, case presentations, demonstrations, and examinations of patients, it provides students with basic instruction in various clinical subjects and prepares them professionally and personally for the clinical clerkships and career electives in the third and fourth years. The program is coordinated by a task force appointed by the Committee on Educational Policy of the School of Medicine and Health Sciences. The task force consists of representatives from the departments responsible for teaching courses in the program: T.E. Piemme *(Chairman)*, Department of Medicine; H.G. Mandel, Department of Pharmacology; Michael McCally, Department of Physiology; F.N. Miller, Jr., Department of Pathology; and Carolyn Robinowitz, Department of Psychiatry and Behavioral Sciences. In addition to Idis 301 *Introduction to Clinical Medicine* (see below), the program consists of Path 201 *Pathology*, Phar 201 *Pharmacology*, and Psyh 201 *Behavioral Sciences*.

301 **Introduction to Clinical Medicine** (16) Staff

A year course. An integrated organ-oriented, interdepartmental course providing fundamental instruction in anesthesiology, child health and development, dermatology, gynecology, internal medicine, neurology, obstetrics, ophthalmology, psychiatry, radiology, and surgery; emphasis on physical diagnosis and laboratory medicine. Includes Life Cycle, dealing with the interpersonal relationships of the physician and his patients and their families.

Medical and Public Affairs

Chairman: Murdock Head

Professor Murdock Head
Professorial Lecturers R.D. Cotton, Thomas Bryant
Associate Professors F.J. Kavanaugh *(Research)*, R.H. Ross *(Research)*
Assistant Professors Elzberry Waters, Jr. *(Research)*, S.F. Fiscina *(Research)*
Instructor I.C. Mohler, Jr. *(Research)*

351 **Forensic Medicine** (2) Sharpe*, Head

Open to 2nd-year medical students. Examples drawn from the range of problems arising when the professional interests of lawyers and physicians overlap. Problem contexts include malpractice, personal injury litigation, licensure and discipline, ethics and economics, hospitals and other institutions of practice, and compelled treatment. (Fall)

* Dr. Sharpe is Professor of Law in the University's National Law Center.

354 **Seminar: Health Care Delivery Systems** (2) Sharpe*, Cotton

The role of lawyers and physicians in national health care legislation-making: issues of design, finance, and administration; problems in reconciling the expectations of the users and providers of health care services. **Limited enrollment.** **(Spring)**

Medicine

Chairman: W.N. Jensen
Associate Chairman: G.A. Kelser, Jr.
Directors of Divisions: Halla Brown *(Allergy)*, G.A. Kelser, Jr. *(Cardiology)*, W.O. Dobbins III *(Gastroenterology)*, T.E. Piemme *(General Medicine)*, L.S. Lessin *(Hematology-Oncology)*, L.K. Alpert *(Metabolic and Endocrine Diseases)*, D.J. Massaro *(Pulmonary Diseases)*, J.P. Naughton *(Rehabilitation Medicine)*, A.E. Parrish *(Renal Diseases)*, W.R. Felts, Jr. *(Rheumatology)*

Professors M.J. Romansky, L.K. Alpert, J.M. Evans, C.S. Tidball *(Research)*, A.E. Parrish, F.W. Wolff, Halla Brown, Irene Tamagna, J.J. Feffer, W.N. Jensen, T.E. Piemme, Leon Bernstein, J.P. Naughton, G.A. Kelser, Jr., S.M. Fox III, H.V. Pipberger, H.J. Zimmerman, J.A. Curtin, D.J. Massaro, R.P. Kaufman, Tsung O. Cheng, Joseph Lindsay, Jr., R.J. Bulger, J.R. Hogness, Fred Leonard *(Research—Rehabilitation Medicine)*, W.O. Dobbins III, J.M. Bacos, E.R. Simon, H.E. Ratcliffe *(Visiting)*

Clinical Professors A.G. Prandoni, J.J. Rheingold, T.S. Sappington, A.B. Rosenbaum, T.J. Greenwalt, Benjamin Manchester, L.E. Putnam, M.H. Stolar, C.W. Thompson, Milton Gusack

Associate Professors W.R. Felts, Jr., Irene Hsu, Ariel Hollinshead *(Research—Pharmacology)*, N.C. Kramer, J.B. O'Connell, Lawrence Pierce, K.L. Becker, J.D. Finkelstein, K.M. Stevens, Mahmoud Mourad, L.S. Lessin, A.F. Mastellone *(Physical Medicine)*, O.S. Selawry, Karl Wipplinger, Gloria Eng, V.T. DeVita, M.J. Jackson *(Research)*, Michael McCally, P.A. Gorman, J.C. Rios, W.F. Barth, James Stengle, W.H. Scott, Philip Witorsch, Robert Kermowitz, John LaRosa, Gloria Massaro *(Research—Pulmonary Diseases)*, Riaz Haider *(Research)*, J.R. Shapiro, C.M. Voyles, D.S. O'Leary

Associate Clinical Professors Joseph Ney, J.W. Latimer, Jr., S.J.N. Sugar, H.D. Ecker, C.W. Jones, Maurice Mensh, F.J. Murray, E.P. Parker III, M.H. Rosenberg, Jack Kleh, H.M. Silver, J.P. Mann, Edward Adelson, R.R. Belton, S.D. Loube, Arthur Ruskin, C.A. Rosenberg, L.J. Thomas, W.O. Bailey, Jr., Ruth Benedict, S.W. Kirstein, Israel Kessler, W.D. Brill, Marvin Fuchs, C.A. Schulman, Alfred Baer, Bertel Nelson, J.M. Pisani, S.W. Bush, Joseph King, M.H. Jacobson, J.P. Nasou, Raymond Standard, Henry Simmons, E.J. Leonard, Joseph Fenton *(Clinical Psychology)*, Peter Birk, R.B.W. Smith, L.B. Hobson, S.H. Danovitch

Associate Professorial Lecturer J.C. Penhos *(Endocrinology)*

Assistant Professors F.A. Peck, T.R. Shworles *(Research—Social Psychology)*,

* Dr. Sharpe is Professor of Law in the University's National Law Center.

P.M. Berkman, C.H. Chan, D.H. Goodman, Geraldine Schechter, W.S. Chi
S.A. Schroeder, M.H. Cohen, W.P. Fortune, J.F. Meyer, P.O. Periman, K.J
Dickie, J.R. Whiteman *(Research)*, Joan Postow, Anne Thompson, Kare
Olness, Tali Bashour, G.M. Gacad, R.A. Goldstein, P.P. Klug, R.A. Nicklas
R.A. Noble, Barbara Sherwin, S.V. Spagnolo, Jean Vazuka, J.E. Zimmer
man, J.M. Wise *(Allied Health)*, Philip Assatourians, R.F. Cioffi, Mar
Silverman *(Allied Health)*, J.A. Snow, S.H. Mendelson, Atin Guha, B.E
Fosseick, Jr., A.L. Ginsberg, J.B. Crandall, H.J. Gorfinkel, W.K. Haisty
Jr., H.B. Marsh *(Cardiology)*, A.A. Oboler, D.R. Rosing, E.W. Sutherland
III, K.H. Chase, J.B. Taylor, Dorothy Gail *(Research)*, Michelle Warren
March Enders *(Rehabilitation Medicine)*

Assistant Clinical Professors David Horwitz, S.T. Gibson, M.H. Rose, Adolph
Friedman, J.W. Long, T.L. Hartman, Boris Rabkin, L.A. Craig, Jr., A.W
Danish, Alvin Seltzer, C.E. Law, Sr., E.L. Rea, H.O. Mott, N.H. Rubenstein
W.L. Stone III, B.H. Ostrow, W.R. Ehrmantraut, G.A. Chapman, F.M
Gross, Silas Babin, Jr., Alice Brigham, Jack Crowell, D.S. Davis, F.K. Harris
II, R.F. Dyer, E.H. Bauersfeld, William Lewis, H.I. Passes, C.W. Foulke
A.A. Lear, O.W. Donnelly, R.S. Poole, H.C. Sadin, S.J. Talpers, W.L. Hall
Raymond Scalettar, M.A. Sislen, G.C. Buchanan, G.T. Economos, Irwin Ar
dam, S.E. Barr, H.A. Moskovitz, J.T. Hagenbucher, G.N. Polis, W.F. Mor
rissey, R.A. Apter, Jean Lucas, B.R. Cooperman, Francis Chucker, R.S. Wi
kinson, W.E. Gallinek, L.H. Biben, W.H. Harvey, William Kurstin, Dor
thea Chapman, L.H. Fenton, Paul Schlein, D.J. Hand, P.A. Haber, M.S
Wolfe, C.H. Oliver, Jr., D.A. Morowitz, Guiseppe Balsamo, G.J. Thorpe
A.B.C. Knudson, N.L. Christopher, G.H. Coffey, G.H. Nachnani, R.A
Fischer, Bernard Grand, R.M. Kaufman, M.J. Stern, Cesar Rudzki, R.A
Giannella, P.O. Woolley, Jr., H.C. Singer, E.B. Thompson, Richard Schoen
feld, N.P. Trujillo, P.R. Lenz, M.M. Shefferman, L.M. Weiss, A.M. Mond
zac, R.K. Sarin, Daniel Ein, Frederick Rickles, S.J. Wolin, T.A. Bensinger
J.P. Gockerman, B.K. Singh, Bernardo Kotelanski, D.A. O'Kieffe, R.J. Kur
pick, G.L. Adams, M.S. Maillis, W.Y.K. Goo, M.J. Halberstam, J.F. Mer
mel, S.N. Richman, T.P. Dwyer, S.M. Fidler, Alfred Muller, R.A. Ratner
Amiel Segal *(Hematology-Oncology)*, R.B. Castell, E.C. Levister, Jr., Cynthia
Miller, B.L. Manalo, P.G. Ventry, R.G. Knodell, M.J. Haut, William Muller

Instructors Bryan Arling, W.L. Bomar, Jr., R.F. Knauft, I.C. Mohler, Jr. *(Research)*, T.G. Sinderson, D.L. Solanki, Judith Fallon, R.E. Rose *(Research)*

Clinical Instructors N.K. Bohrer, N.G. Goodman, J.D. Herman, Frederick
Meyers, Lily Ruckstuhl, C.U. Shilling, Robert Kramer, F.J. Borsody, D.W
Datlow, R.M. Huffman, L.P. Appel, M.A. Herman, R.O. Knox, R.W. Turner
S.A. Schwartz, Marvin Schneider, Harris Kenner, G.A. Tralka, L.F. Barker
D.D. Haut, Isaac Weiszer, A.J. Anderson, P.G. Rochmis, Paul P.L. Chang
N.T. Connally, J.C. Perkins, H.J. Alpert, P.V. Holland, Leo Janis, S.R. Rish
Israel Spector, B.G. Vlalukin, Devanhalli Ramaswamy, Dorothy Miller
Hoyoko Yahanda, Manoochehr Pooya, Lawrence Klein, H.R. Birschbach
H.S. Mirsky, K.H. Rand, M.W. Graf, N.A. Crane, H.J. Eisen, N.S. Otchin
H.S. Sabatier, Jr., M.D. Sklar, Mark Greene, M.M. Gottesman, J.W. Benson
Jr., S.F. Stein, W.S. Byers, Byung-Il Choi, Nicholas Mendjuk, Toby Simon
P.S. Spiegler, John Weiler, Valery Miller, I.V. Magal, R.A. Berenson, W.D
Lassek, J.M. McGinnis, P.M. Ness, J.A. Sandler

Special Lecturers Sol Katz *(Pulmonary Diseases)*, D.S. Fredrickson *(Internal Medicine)*, W.C. Roberts *(Cardiology)*, Martin Shargel

Courses numbered 101 through 198 are for students in the Physician's Assistant and Nurse Practitioner programs.

101 **Normal Structure and Function of Man** (9) **Staff**

Lecture, film, and demonstration. The normal structure and function of man as an integration of anatomy, chemistry, and physiology, comprising the major systems of the human body: (1) cellular, (2) musculoskeletal, (3) nervous, (4) endocrine, (5) cardiovascular, (6) respiratory, (7) gastrointestinal, (8) urinary, (9) reproductive, and (10) integrated. (Fall)

107 **Public Health** (1) **Staff**

The patient data base and the problem-oriented medical record; introduction to medical epidemiology. The health care team, medical and allied health disciplines, and community health resources. Public health issues and the physician's assistant role in patient education. (Fall)

109 **Human Behavior I** (2) **Staff**

Theory and techniques of effective communication with patients; counseling and psychotherapy. (Fall)

113 **Medicine and Society** (1) **Staff**

Survey of the history of medicine, medical ethics, sociological and anthropological aspects of medical practice, major issues facing modern medicine in the United States. (Fall)

116 **Medical Terminology** (1) **Cassidy**

Terminology and vocabulary basic to all areas of medical science, hospital services, and allied health specialties. (Fall)

119 **Introduction to Patient Care I** (1) **Staff**

Patient histories, routine physical examinations, use of the routine equipment of clinical examination. (Fall)

125 **Manifestation of Disease** (7) **Staff**

Pathologic and abnormal structure and function encountered in clinical disease states. A functional approach to clinical medicine, including sign symptoms and diagnosis of disease states. (Spring)

128 **Mechanisms of Disease** (6) **Staff**

Introduction to microbiology; lectures accompanied by audio-visual material. Concepts of the processes of pathology and their use in clinical medicine; mechanisms of the disease process and their anatomic manifestations in each organ system; lectures and gross pathology demonstrations in which the student will present clinical case histories of hospitalized patients and review the material with a pathologist. (Spring)

131 **Human Behavior II** (1) **Staff**

Continuation of Med 109. Prerequisite: Med 109. (Spring)

134 **Introduction to Patient Care II** (1) **Staff**

Continuation of Med 119. Prerequisite: Med 119. (Spring)

137 **Dynamics of the Life Cycle** (1) **Staff**

Four hours a week for 20 weeks. Issues surrounding the more controversial topics in modern health care delivery. (Spring)

Staff

140 **Clinical-Pathological Correlation** (1)

Three hours a week for 20 weeks. Instruction in the format for case presentations as well as the proper methods used for clinical integration of signs and symptoms of disease. (Spring)

Staff

142 **Nursing Seminar I** (2)

Integration of clinical science, pathophysiology, pharmacology, and physical diagnosis to facilitate the application of new knowledge and skills to the nursing process and to address issues of role reidentification, team concepts, and legal aspects of nursing.

Staff

143 **Nursing Seminar II** (3)

Continuation of Med 142.

Staff

144 **Nursing Seminar III** (3)

Continuation of Med 142 and 143.

Staff

146 **Animal Surgery** (3)

Theoretical and actual experiences in the area of surgery. Lectures, demonstrations, and audio-visuals demonstrating proper sterile technique, various ways of controlling hemostasis, types and ways of debredment, and importance of anethesia and respiratory monitoring in surgery. Basic general surgical techniques such as sponging, suctioning, retracting, knot-tying, etc. Opportunities for student participation in performing surgery on experimental animals using proper surgical techniques, procedures, and skills. Intubations, cutdowns, para- and thora-centeses, debredments, and major surgical procedures such as splenectomies, appendectomies, etc. Students are organized into teams which will shift responsibilities among them, e.g., surgeon, first assistant, anesthesiologist. (Summer)

Staff

147 **Introduction to Radiology** (2)

Emphasis on basic language, science, and principles of radiology, including such aspects as safety, positioning, protection-requesting studies, etc. Basic elements of topographic anatomy as applied to radiology. The differentiation of abnormal from normal on chest, abdominal, and extremity films. Basic pattern recognition along with a systematic approach to each X-ray interpretation. Appropriate use and therapeutic and diagnostic value of nuclear medicine studies as well as special procedure studies in radiology. (Summer)

Staff

148 **Introduction to Electrocardiography** (2)

Emphasis on the performance of a technically competent electrocardiogram by each student. Basic theory behind electrocardiography as well as interpretation of basic EKG patterns. Common errors of taking and reading EKG's. Identification of common normal and abnormal wave patterns on EKG's. Value and appropriate use of echocardiography and phonocardiography, as well as the principles and technical competence of performing simple exercise tolerance testing. (Summer)

Staff

150 **History-taking Review and Theory** (1)

Theories of taking, presenting, and writing up a competent history; e.g. traditional approach, problem-oriented approach, etc. Techniques for gathering important, yet potentially embarrassing and threatening, areas of the patient's history. Discussion and direct use of a variety of techniques and approaches for collecting historical information from different patient types. Opportunities for live, observed patient interviews, con-

structively evaluated. Discussion of oral and written presentation of histories taken outside class. (Summer)

151 **Clinical Pharmacology** (1) Staff

Day-to-day clinical situations for discussion of the appropriate use of some of the more common drugs in a primary care practice. Dosages, actions, routes of administration, indications, and contraindication as applied to the specific clinical examples. Advantages, disadvantages, and reasons for deciding on the primary drug of choice and possible alternative therapy. When and how to use the PDR. Review and discussion of the importance and advantages of taking an accurate and complete drug history.

152 **Introduction to Basic Laboratory Medicine** (3) Staff

(Formerly Laboratory Medicine I (1))

Theory, performance, and interpretation of some of the more important routine basic clinical laboratory tests that can be performed in a physician's office, such as complete blood counts with differentials, staining and reading smears, urinalysis and urine cultures, routine chemistries (sugar, BUN, electolites), and microbiological culture and staining techniques and organism indentification. Lecture and demonstration with appropriate use of audio-visuals. Appropriately supervised and evaluated performance of these tests in a laboratory setting. (Summer)

153 **Gynecology Outpatient: Nurse Practitioner** (3) Staff

154 **Psychiatric Outpatient: Nurse Practitioner** (2) Staff

155 **Emergency Medicine** (1) Staff

Clinical rotation designed to acquaint the student with the handling and transporting of emergency cases. Lectures, demonstrations, discussions; two nights each week in observation on a D.C. Fire Department Ambulance Service. (Summer)

156 **Ambulance Service** (1) Staff

Acquaintance with management of the emergency situation, artificial respiration and resuscitation, cardiopulmonary resuscitation, bleeding, soft tissue injury, CNS injury, injury to the extremity, common medical emergencies—burns, poisoning, obstetrical-gynecological emergencies; handling/transporting emergency cases. (Summer)

157 **Primary Care Preceptorship: Nurse Practitioner** (6) Staff

158 **Pharmacology** (2) Staff

Lecture/demonstration course intended to provide the student with a working knowledge of the structure and utilization of the pharmacologic agents most commonly used in today's treatment regimes. (Spring)

160 **Medical Inpatient** (4) Staff

Six-week required rotation for Physician's Assistant students. Attendance required at all work rounds, teaching rounds, noon conferences, and grand rounds of the medical service. (Fall, spring, summer)

163 **Medical Outpatient** (4) Staff

Six-week required rotation for Physician's Assistant students. Introduction to problems encountered in managing the patient outside of the hospital ward. (Fall, spring, summer)

164 **Pulmonary Medicine** (3)
Four-week rotation. Development of competence in and understanding of pulmonary function and disease processes; attendance required at all rounds and conferences as designated by the chief of the service. (Fall, spring, summer)

165 **Medical Outpatient: Nurse Practitioner** (4)

166 **General Surgery** (4)
Four-week required rotation for Physician's Assistant students. In-depth experience in management of the pre-operative and post-operative care of the surgical inpatient; attendance required at all surgical lectures. (Fall, spring, summer)

169 **Obstetrics and Gynecology** (4)
Six-week required rotation for Physician's Assistant students. Exposure to outpatient obstetrical and gynecological problems; attendance required at all lectures, rounds, and conferences applicable to staff on the obstetrics-gynecology service; "on call" status in the delivery room required every third night. (Fall, spring, summer)

170 **Obstetrics: Nurse Practitioner** (6)

171 **Pediatric Outpatient: Nurse Practitioner** (6)

172 **Pediatric Outpatient** (4)
Six-week required rotation in an affiliated hospital for Physician's Assistant students. Acquaintance with routine pediatric illness; required rotation every third night in the emergency room; required attendance at all rounds and conferences. (Fall, spring, summer)

175 **Primary Care Preceptorship** (12)
Eight-week required rotation for Physician's Assistant students. Exposure to all aspects of the practice of medicine, including administration, in a community setting; rounds with attending physician in a hospital setting. (Fall, spring, summer)

178 **Emergency Room** (4)
Six-week required rotation for Physician's Assistant students. Opportunity to deal with acute life-threatening, traumatic, and psychiatric emergencies; emphasis on learning technical skills such as reconstructive suturing; attendance required at all applicable conferences; exposure to surgical and medical emergency management problems. (Fall, spring, summer)

179 **Emergency Care: Nurse Practitioner** (2)

180 **Cardiology** (3)
One-month rotation. Indications, limitations, and methods of accomplishing the necessary diagnostic procedures and therapeutic regimens for the evaluation of cardiac disorders; attendance required at all daily rounds and conferences as indicated by the physician in charge. (Fall, spring, summer)

181 **Hematology** (3)
One-month rotation. Introduction to the most commonly seen hematologic disorders; observation of and participation in various hematologic procedures and tests in the hematology laboratory and blood bank; atten-

ance required at all hematology rounds and conferences. (Fall, spring, summer)

182 **Endocrinology** (3) **Staff**

One-month rotation. Exposure to endocrinological disease; indications, limitations, and methods of performing diagnostic procedures, emphasis on diagnosis and treatment; attendance required at all relevant rounds and conferences. (Fall, spring, summer)

184 **Gastroenterology** (3) **Staff**

One-month rotation. In-depth exposure to gastroenterology; emphasis on diagnosis and treatment of gastroenterologic conditions; attendance required at all related conferences and daily rounds as prescribed by the service. (Fall, spring, summer)

186 **Nephrology** (3) **Staff**

Four-week rotation. Exposure to nephrologic disorders; emphasis on development of insight into the indications and limitations of diagnostic procedures used in the evaluation and treatment of renal diseases; attendance required at all relevant rounds and conferences. (Fall, spring, summer)

187 **Neurology** (3) **Staff**

One-month rotation. In-depth exposure to neurological conditions through inpatient and outpatient care and through evaluation of patients by appropriate history and physical techniques during examination. Attendance required at all scheduled neurology rounds and conferences. (Fall, spring, summer)

188 **Rheumatology** (3) **Staff**

Four-week rotation. Exposure to therapeutic regimens, their indications, availability, reliability, and limitations in the treatment of rheumatologic disorders; acquaintance with possible and variable dispositions of patients from admission to discharge; attendance required at daily rounds and teaching conferences as designated by the service. (Fall, spring, summer)

190 **Dermatology** (3) **Staff**

Four-week rotation. Exposure to a broad spectrum of dermatologic disease from both inpatient and outpatient standpoint; acquaintance with various possible dispositions for dermatologic patients from admission to discharge; attendance required at all daily rounds and conferences required by the service. (Fall, spring, summer)

192 **Orthopaedics** (3) **Staff**

Four-week rotation. In-depth exposure to inpatient and outpatient orthopaedic injuries and diseases. (Fall, spring, summer)

194 **Urology** (3)

Four-week rotation. Introduction to inpatient and outpatient urologic problems; attendance required at all rounds, lectures, and conferences applicable to urology house staff. (Fall, spring, summer)

196 **Radiology** (3) **Staff**

Four-week rotation. Student builds on skills learned in Med 101 and learns clinical diagnostic radiology; attendance required at all applicable

conferences and rounds as required by the Department of Radiology. (Fall, spring, summer)

Staf

197 **Student Health** (3)

A six-week experience designed to introduce the student to care of pa tients primarily between the ages of 18 and 28. Experience in the rapid assessment and management of patients with nonlife-threatening illness in a busy student health service environment. (Fall)

Staf

198 **Psychiatric Outpatient** (3)

Three-week required rotation for Physician's Assistant students. Designed to give the student confidence in handling the common psychiatric di orders which constitute a large segment of the patient population serve in general practice. Attendance required at pertinent psychiatric confer ences and teaching rounds. (Fall, spring, summer)

Staf

*305 **Inpatient Clerkship** (15)

Training in comprehensive study of patients; history and physical exam nation; ward rounds, consultations, conferences, preceptorial teaching, sem inars. V.A., Univ. hosps., and Wash. Hosp. Center (12-week perio throughout academic year)

Staf

*308 **Outpatient Medicine and Emergency Room** (10)

Care of ambulatory patients and emergency cases under close supervision Daily clinics in general medicine and various specialties; conferences on current cases. Univ. Clinic and Hosp. Emergency Room (8-week per ods throughout the academic year)

LaRos

311 **Rehabilitation of Teenage Drug Offenders** (1)

Students participate one evening a week in the youth rehabilitation pro gram of the Narcotics Treatment Administration of the District of Colum bia. Students encouraged to establish communication with one or two ad dicts and to investigate in depth factors that led them to addiction. Semi nars dealing with various aspects of drug abuse held on alternate Saturda mornings. Limited to 10 students. (Fall)

Brow

320 **Experience in Allergy** (10)

Clinical experience in allergy. 8-week elective periods. Univ. Clinic.

Brow

323 **Impact of the Inner-city Environment on Asthma** (5 or 10)

Each student is assigned one or two patients. Under the guidance of a internist or psychiatrist, the student takes care of the patient medica and allergically and studies his psychodynamics. With the patient, th student visits the patient's home and family and areas the patient finds successful (welfare office, food stamp office, court of law, public housing office, Neighborhood Legal Services, etc.) 4- or 8-week elective periods Univ. Clinic

Perima

324 **Immunology** (10)

Clinical, laboratory, and research aspects of immunology. Readings in weekly seminar; emphasis on basic immunological techniques and the im munological basis of appropriate disease entities. Opportunity for inde pendent, supervised research. 8-week elective periods. Univ. Clinic

* Required for medical students.

326 **Research: Allergy** (10) Brown

Research in clinical or experimental allergy or related field. 8-week elective periods. Univ. Clinic

330 **Advanced History and Physical Analysis** (10) Lewis

Students function as interns; emphasis on the true merit of the case history and physical examination. 8-week elective periods.

332 **Acting Intern in Medicine** (5 or 10) Arling

Students assume intern responsibilities under direct supervision of a medical resident and the attending physician. Work-up, evaluation, and management of patients in conjunction with resident and private physician. Full participation in ward activities and house staff conferences. 4- or 8-week elective periods. Univ. Clinic

333 **Acting Intern in Medicine** (5 or 10) Curtin

Student works with a patient-care team on a medical ward, does initial evaluation and presents patient's problem at attending rounds and at appropriate teaching conferences, under the supervision of the medical resident and the attending physician. Subspecialty consultations also review patient's problem with the student. 4- or 8-week elective periods. Wash. Hosp. Center

334 **Acting Intern in Medicine** (5 or 10) Zimmerman

Student functions as an intern on the general medical wards, under supervision of a resident. With the resident, he is responsible for work-up, diagnosis, and management of patients. Student will present his patients during attending rounds and house staff conferences. 4- or 8-week elective periods. V.A. Hosp.

337 **Inpatient Medicine** (5 or 10) Curtin

Participation with a patient-care team on a medical ward. Initial evaluation and presentation of patient's problem at attending rounds and teaching conferences. 4- or 8-week elective periods. Wash. Hosp. Center

340 **Ambulatory Health Care** (10) Piemme

Participation in community health program, including the University Clinic, University Hospital Emergency Room, and a transportation system. Students are involved in all facets of the program. Each student is expected to study a specific element of the system with respect to its effect on the capacity to deliver health care within a community. Exchange with similar programs in other universities is possible for students who elect more than the 8-week minimum. Conferences, reading assignments. 8-week elective periods. Univ. Hosp.

341 **Emergency Health Care** (5) Noble

Emergency room experience designed to allow the experimental maximum of patient care. Instruction by medical or surgical resident. Limited tour with the D.C. Fire Department Ambulance Service. 4-week elective periods. Univ. Hosp.

345 **Family Practice Preceptorship** (5) Anderson*

Students participate in a small urban community family practice. 4-week elective periods. Waynesboro, Va.

* Dr. Anderson is in private practice in Waynesboro, Virginia.

352 **Clinical Cardiology** (10) Hsu and Staf

Experience in ambulatory and hospitalized patient care: ECG's, VCG's graphics, exercise laboratory, observation and participation in hyper tensive research clinic. 8-week elective periods. Univ. Clinic

353 **Clinical Cardiology** (10) Manchester

Observation of and participation in the diagnosis and clinical manageme of cardiovascular disorders. Acquaintance with physical signs of hea disease. Exposure to noninvasive diagnostic procedures, interpretation electrocardiograms and chest X-rays, and ward rounds in intensive coro nary care unit. 8-week elective periods.

358 **Introduction to Cardiology** (5) Bacos, Mendelson, Marsh, Obol

Participation in clinical cardiology, correlating the bedside approach t cardiovascular diagnosis with special diagnostic studies, including phono cardiography, atrial electrocardiography, cardiac catheterization, and an giocardiography, etc. 4-week elective periods. Wash. Hosp. Center

359 **Introduction to Acute Coronary Care** (5) Bacos, Mendelson Marsh, Obol

Emergent approach to acute myocardial infarction including anatomy o the coronary tree and physiology of coronary circulation, physical diagno sis of the complications of infarction, theory and indications for pace maker insertion, and electrocardiographic monitoring and acute myo cardial infarction. 4-week elective periods. Wash. Hosp. Center

360 **Clinical Cardiology** (5 or 10) Fletcher

Under supervision, the student is responsible for reading electrocardio grams, consulting on cardiovascular-clinical problems, and participatin in various cardiac catheterization and angiographic procedures. Experi ence in cardiac fluoroscopy, and vectorcardiography. Teaching rounds conferences. 4- or 8-week elective periods. V.A. Hosp.

363 **Cardiac and Medical Intensive Care** (5) Saunders

Students participate in all aspects of coronary care, including cardiover sion, pacemakers, Swan-Ganz catheters, and intra-aortic balloon counter pulsation. Management of a spectrum of other medical emergencies such as diabetic ketoacidosis, septic shock, uremia, hepatic coma, GI bleeding and respiratory failure. Instruction in (1) the use of mechanical ventila tors and oxygen therapy, and (2) the management of respiratory and metabolic acid-base problems and a variety of fluid and electrolyte abn normalities. 4-week elective periods. V.A. Hosp.

364 **Cardiovascular Data Processing** (5 or 10) Pipberg

Study of a variety of modern computer techniques: primary research in computer analysis of electrocardiograms. 4- or 8-week elective periods. V.A. Hosp.

365 **Clinical Electrocardiography and ECG Computer Analysis** (5 or 10) Pipberger

Participation in daily computer processing and analysis of all electrocardio grams from two V.A. hospitals and Children's Hospital. D.C ECG find ings correlated with clinical data from all problem cases. Daily review

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* Dr. Fletcher is Chief of Cardiology at the Veterans Administration Hospital.

† Dr. Saunders is Chief of Medicine for Intensive Care at the Veterans Administration Hospital

sessions with Section Chief and cardiac fellows. Participation in weekly seminars and a Journal Club. 4- or 8-week elective periods. V.A. Hosp.

370 **Endocrinology and Cancer Chemotherapy** (5) L. Alpert

Clinical work; emphasis on endocrinology (and metabolism) or cancer chemotherapy, depending on student's choice. 4-week elective periods. Univ. Clinic

371 **Endocrinology** (5) Shapiro

Student evaluates patients referred to the endocrinology service, takes part in planning diagnostic work-ups or therapy programs, and is responsible for case presentations of patients he has worked up. Exposure to techniques used in the endocrinology laboratory, such as protein binding determinations and radio-immuno assay of hormones; participation in Journal Club 2 mornings a week and in weekly conferences. The student is expected to assume prime responsibility for directing patient evaluations. 4-week elective periods. Wash. Hosp. Center

373 **Endocrinology and Metabolism** (5 to 15) Becker

Clinical experience in endocrinology and metabolism. Students examine endocrine patients, make preliminary diagnoses, and assist in treatment. Clinical rounds twice weekly; weekly endocrine clinic, diabetic clinic, and Journal Club participation; laboratory and research experience available. 4- to 12-week elective periods. V.A. and Univ. hosps.

376 **Metabolic Disorders in Diabetes** (5) Penhos

Intensive and practical studies of the technique to produce surgical, chemical, and hormonal diabetes. Participation in research on carbohydrate, protein, and lipid metabolism, insulin secretion in isolated organ perfusions. Seminars and participation in Journal Club; discussions on the results obtained. 4-week elective periods. V.A. Hosp.

381 **Research in Endocrinology** (5) Penhos

Participation in endocrine research, including laboratory experience, experimental surgery, biochemical methods, and *in vivo* and *in vitro* endocrine studies. Weekly seminars and discussions correlate experimental results with clinical observations. 4-week elective periods. V.A. Hosp.

385 **Biochemical Abnormalities in Disorders of Lipoprotein Metabolism** (15) LaRosa

Current research directed toward the biochemical purification of enzymes responsible for removing lipids from the plasma and a study of the possible relationship between induction of these enzymes and the progestional and estrogenic components of currently used birth control pills. Experience in the use of modern techniques of protein separation, including ultracentrifugation, electrophoresis, and chromatography; experience in handling radioactive isotopes. Clinical experience with patients who have hyperlipoproteinemia. 12-week elective periods. Nat'l. Heart and Lung Institute, NIH, and Univ. Hosp.

387 **Diabetes Research Laboratory** (15) Recant*

Research oriented toward the patient with diabetes mellitus. Studies in humans, laboratory animals, isolated perfused organs, and isolated tissue *in vitro*. Diagnostic studies for hypoglycemia and hyperglycemia. Con-

* Dr. Recant is Chief of the Diabetes Research Laboratory at the Veterans Administration Hospital.

sultations and rounds on patients with problems in carbohydrate or lipo metabolism. Weekly conferences. 12-week elective periods. V.A. Hosp

390 **Extramural Internal Medicine Elective** (arr.)

The Department arranges for students to spend elective periods at othe institutions. Interested students should contact the Chairman of the De partment.

391 **Clinical Oncology** (10 or 15) Selawr

Participation in clinical management of patients with carcinoma on the medical oncology ward. 8- or 12-week elective periods. V.A. Hosp.

393 **Medical Oncology** (10) DeVit

Experience in current methods in evaluation and treatment of lymphoma chronic leukemias, ovarian, breast, and other malignancies, including view of the broad spectrum of these diseases. Participation in patie care and laboratory studies of current research in clinical pharmacolog tumor kinetics, and *in vitro* marrow culture techniques. 8-week elective periods. Nat'l. Cancer Institute, NIH

394 **Cell Kinetics** (10 or 15) Selaw

Study in the medical oncology section on the generation time and diva ing pool of cancer cells *in vivo* before and during therapy. 8- or 12-wee elective periods. V.A. Hosp.

396 **Clinical Pharmacology** (15) Wall

Introduction to clinical pharmacology and toxicology as the basis of th regulatory work of the Food and Drug Administration. Collaborativ with a team of scientists dealing with the review of investigational ne drug applications and new drug applications, with a drug experience re porting system, and with annual reviews of drugs in specific areas, emphs sizing study of the benefit/risk ratio. Project work in a toxicology labora tory. Interview required. 12-week elective periods. Bureau of Drug FDA

397 **Clinical Pharmacology of New Antineoplastic Agents** (10 or 15) Selawr

Study in the medical oncology section; emphasis on clinical therapeuti and the use of biochemical or other methodology for the determinatio of drug uptake, metabolism, excretion, and assay of marker substances indicators for tumor response. 8- or 12-week elective periods. V.A Hosp

402 **Research in Cancer Immunology** (10) Hollinshe

Laboratory experience with tests used to correlate cellular anti-tumor a activity to solid tumors with the clinical course of the disease; experiment to investigate viral etiology of certain forms of cancer; study of fetal an gens and role in oncogenesis; cell membrane antigens specific for leukemi 1 senior; 8-week elective periods. Ross Hall

403 **Research in Cancer Immunology** (10) Penn

Emphasis on attaining a background in the advancements of the last years which have led to immunodiagnostic and immunotherapeutic tec niques for cancer. Further research opportunities available. Weekly seminars. 8-week elective periods. Univ. Hosp.

412 **Clinical Gastroenterology** (5 or 10) Danish

Work in a suburban office devoted to private partnership practice of internal medicine with emphasis on gastroenterology. Hospital rounds, evaluation of problems, discussion with attending physician and/or patient in terms of diagnosis and therapy, observation of and assistance in specialized procedures, practical aspects of office management. 4- or 8-week elective periods.

413 **Clinical Gastroenterology-Hepatology** (5 or 10) Dobbins, Ginsberg

Intensive clinical experience with patients who have digestive disease, including those of the gastrointestinal tract, liver, and pancreas. Patient consultations, teaching rounds, seminars. Joint conferences with surgery, pathology, and radiology emphasize the multidisciplinary approach in digestive diseases. 4- or 8-week elective periods. Univ. Clinic

414 **Clinical Gastroenterology-Hepatology** (10 or 15) Finkelstein

Students see patients referred to the gastroenterology-hepatology section for consultation and are responsible for initial evaluation and the follow-up of these patients. Participation in all specialized procedures including various biopsy techniques and endoscopies. Teaching rounds, conferences, seminars. Student elects to concentrate in either gastroenterology or hepatology. 8- or 12-week elective periods. VA Hosp.

423 **Clinical Gastroenterology** (5) Trujillo

Introduction to clinical problems in diagnosis and treatment of gastroenterology in both office and hospital practice. Peritoneoscopy, endoscopy, and biopsies. 4-week elective periods. Univ. Hosp.

424 **Morphology of the Liver and Intestines** (10) Dobbins

Research designed to acquaint the student with a variety of morphologic techniques used in the study of mucosal disease of the gastrointestinal tract. Includes electron microscopy and light microscopy techniques—phase and fluorescent microscopy. Preference given to student able to continue on a part-time basis following completion of the elective. 8-week elective periods. Univ. Clinic

426 **Research in Metabolism of Sulphur Amino Acids** (15) Finkelstein

Study of methionine metabolism in mammalian tissues using several research techniques: kinetic properties of purified enzymes; induction and repression of enzymes by hormones and diet; metabolism of methionine in the isolated perfused rat liver. Projects available in any of the above areas and will be developed further to meet student needs. 12-week elective periods. V.A. Hosp.

430 **Clinical Hematology** (5) Schechter*

Study of the methods for evaluation and treatment of patients with hematological disorders. Ward rounds, morphology review sessions, participation in hematology clinic and Journal Club. 4-week elective periods. V.A. Hosp.

431 **Clinical Hematology** (5 or 10) Lessin and Staff

Participation in the diagnosis and therapy of hematologic disorders, including inpatient and outpatient hematology consultations, daily care, and follow-up of clinical hematologic problems. Emphasis on acquainting the

*Dr. Schechter is a member of the Hematology Section at the Veterans Administration Hospital.

student with modern hematologic diagnostic procedures and current liter
ture. 4- or 8-week elective periods. Univ. Hosp. and Clinic

Pierc

432 **Clinical Hematology** (5)

Clinical evaluation of inpatients and outpatients with symptoms referrable
to the myelopoietic system using bedside and laboratory investigative
rameters. 4-week elective periods. Wash. Hosp. Center

Rheingold

433 **Hematology** (5)

Observation of and participation in diagnosis and treatment of patien
with hematologic disorders. 4-week elective periods. Univ. Hosp.

Lessin and Sta

435 **Hematology Research** (10)

Participation in the hematology research laboratory. Emphasis on de
velopment of the student's own project related to dynamic morpholo
of the blood cells, blood cell ultrastructure, and electron microsco
techniques. Introduction to red cell rheology and physiology. 8-we
elective periods. Univ. Hosp.

436 **Hematology Research** (10 or 15) McFarland*, Schechter

The main research deals with lymphocyte biology, in particular thym
genesis, macrophage interactions, and reaction to blood transfusions
man. Facilities available to do *in vitro* human and animal tissue cu
tures, radioisotopic studies, and electron microscopy. 8- or 12-week ele
tive periods. V.A. Hosp.

Greenwal

437 **Blood Transfusion in Clinical Practice** (5)

Demonstration and discussion of the preparation, properties, and clin
use of all blood components and of the basic genetics and immunolo
of the blood groups and allotypes. Opportunity to perform bench w
in resolving immunologic transfusion problems. 4-week elective perio

D. Masser

440 **Pulmonary Medicine** (5 or 10)

Introduction to the diagnosis and treatment of diseases of the lung; expe
ence in the management of patients with acute respiratory failure. Pa
ticipation in daily ward rounds with a full-time faculty member an
weekly pulmonary grand rounds and the lung seminar series. Work-up
patients with various pulmonary disorders, including pulmonary functi
testing, arterial blood gas studies, exercise studies, and other techniqu
4- or 8-week elective periods. V.A. Hosp.

Witorsch

442 **Pulmonary Diseases** (5)

Performance and interpretation of pulmonary function studies, includin
ventilatory, diffusing capacity, and blood gas analysis; daily teachin
rounds and supervised consultation on patients with various pulmona
and infectious diseases. Participation in pulmonary clinic, technique
principles of inhalation therapy. Principles of and experience with re
piratory failure and respiratory intensive care. 4-week elective perio
Wash. Hosp. Center

D. Masser

447 **Research in Pulmonary Diseases** (15)

Detailed studies of the synthesis and regulation of lung surfactant, mech
anisms of airways obstruction, or immunological aspects of lung d
12-week elective periods. V.A. Hosp.

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* Dr. McFarland is Chief of the Hematology Section at the Veterans Administration Hospital
† Dr. Schechter is a member of the Hematology Section at the Veterans Administration Hospi

451 **Arthritis and Rheumatic Diseases** (5) Felts

Introduction to clinical problems in the diagnosis and treatment of arthritis and rheumatic diseases. Emphasis on patient evaluation and establishment of therapeutic priorities. 4-week elective periods. Univ. Clinic

452 **Clinical Rheumatology** (10) Alepa*

Observation of rheumatology inpatient consultations and participation in the rheumatology clinic. Laboratory facilities available with emphasis on synovial fluid analysis. Special diagnostic techniques, such as needle biopsy of the synovial membrane. Differential diagnosis and management of patients with rheumatologic disorders. 8-week elective periods. V.A. Hosp.

453 **Introduction to Arthritis** (5) Barth

Work-up, rounds, clinic, and consultations on patients with arthritis and rheumatic diseases. Daily discussions on selected topics in rheumatology, including clinical immunology, major disease categories (SLE, RA, gout, etc.); differential diagnosis, drug therapy, serological reactions, X-ray changes. 4-week elective periods. Wash. Hosp. Center

454 **Total Patient Care** (5) Tamagna

Participation in total patient care program, including medical rehabilitation and group evaluation conferences. 4-week elective periods. Wash. Hosp. Center

455 **Physical Medicine and Rehabilitation** (5) Chiu, Mourad, Enders

Participation in all activities in inpatient and outpatient diagnosis, treatment, consultation, and EMG. 4-week elective periods. Univ. Hosp.

456 **Psychomatic Medicine** (5) Naughton, Scott, Stern, Tompkins, Wolin

Experience in psychomatic problems. Orientation to areas of cardiovascular diseases and alcoholism. 4-week elective periods. Univ. Clinic

460 **Renal and Electrolyte Disorders** (5) Berkman

Participation in consultations on renal and electrolyte abnormalities; follow-up of patients. Examination of the urinary sediment and in peritoneal and hemodialysis. Conferences, reading assignments, ward rounds, participation in Journal Club. Student may participate in a research project during an extended elective period. 4-week elective periods. Wash. Hosp. Center

461 **Clinical Renal Disease** (5) Parrish, N. Kramer, Guha

Participation in clinical and laboratory procedures used in the study of renal disease. Ward rounds, consultations, conferences, seminars. 4-week elective periods. Univ. Hosp.

463 **Clinical Application of Tissue Immunology** (5) N. Kramer

Application of immunologic methods to the study of human hypersensitivity states and metabolic diseases; study of serum proteins, including protein hormones and enzymes, research principles and methods; tissue typing and flourescent antibody methods. 4-week elective periods. Univ. Hosp.

* Dr. Alepa is Chief of the Rheumatology Section at the Veterans Administration Hospital

465 **Renal Diseases and Fluid and Electrolyte Problems** (5 or 10) Jacobs

Participation in office and hospital consultations; care of patients wi renal diseases and fluid and electrolyte problems. Student becomes fam iar with a variety of renal problems; works up patients with renal dise evaluates renal function studies. Emphasis on critical use of medical li erature. 4- or 8-week elective periods.

469 **Clinical Renal Disease** (5 or 10) Shalhoub

Broad exposure to and active participation in all the clinical activities o the renal section, including consultations, outpatient clinic, rounds, c ferences, and Journal Club meetings. 4- or 8-week elective periods. V.A. Hosp.

483 **Nuclear Medicine** (15) Sauerbrunn

Introduction to radioisotope methodology as applied to diagnostic or thera peutic problems in medicine. Study of the unique properties of radioac ity, radiation safety, and instrumental uses in the detection of radia Evaluation of patients referred for diagnostic and therapeutic stud Student may choose a selected field of interest for more intensive stud and may engage in limited participation in on-going clinical research pro ects. 12-week elective periods. V.A. Hosp.

Microbiology

Chairman: L.F. Affronti

Professors Mary Louise Robbins, Rudolph Hugh, E.M. Lerner II *(Research* L.F. Affronti
Professorial Lecturer Dorothy Heilman *(Cellular Immunology)*
Associate Professors Melvin Reich, Kun-yen Huang
Assistant Professors Yang-Ming Chu, Rosalie De Giovanni-Donnelly *(Research* Su

‡201 **Medical Microbiology** (6)

For medical students; open to qualified graduate students by special pe mission. Bacteria, rickettsiae, viruses, yeasts, molds, protozoa, metazo which relate to the health and disease of man—cultural studies, metabo of diagnoses, theories. Laboratory fee for nonmedical students, $16. (Spring)

211 **Microbiology** (4) Su

For graduate students. Bacteria, fungi, rickettsiae, and viruses. Laborat tory fee, $16. (Fall)

212 **Pathogenic Microbiology** (4) Sp

For graduate students. Continuation of Micr 211; emphasis on harmf activities of microorganisms. Prerequisite: Micr 211. Laboratory fe $16. (Spring)

* Dr. Shalhoub is Chief of the Renal Section at the Veterans Administration Hospital.
† Dr. Sauerbrunn is Chief of Nuclear Medicine at the Veterans Administration Hospital.
‡ Required for medical students.

214 **Tissue Cell Culture and Somatic Variation** (4) Chu

Techniques of tissue culture and means of studying somatic variations. Prerequisite: Micr 211 or equivalent. (Spring)

219–20 **Scientific Writing for Graduate Students** (1–1) Robbins

Required of all graduate students prior to writing a thesis or dissertation. Some research experience required. (Academic year)

223 **Antimicrobial Chemotherapy** (1) Affronti, Reich

For medical students. Lecture course. Selection, clinical applications, and mechanism of action of various drugs and antibiotics used in the treatment of microbial infections. Members of the clinical faculty discuss relevant aspects of clinical chemotherapy. Prerequisite: Micr 201. (Fall)

225 **Microbial Physiology I** (3) Affronti, Reich

Morphology and biochemistry of various microorganisms with emphasis on bacteria. Prerequisite: Bioc 201 or 221–22; Micr 211 or equivalent. (Fall)

226 **Microbial Physiology II** (3) Affronti, Reich

Effects of physical and chemical agents on microorganisms with emphasis on antibiotics. Prerequisite: Micr 225 or permission of instructor. (Spring)

230 **Immunology** (3) Affronti

Fundamental immunologic concepts. Serologic and immunologic procedures as applied to clinical and research situations emphasized. Prerequisite: Micr 211 or permission of instructor. Laboratory fee for nonmedical students, $16. (Fall)

231 **Immunobiology** (1) Affronti

Study of immunological functions of reticulo-endothelial tissues, theories of autoimmunity, graft rejection, tumor immunity, delayed hypersensitivities, and immunogenetics. For medical students; open to graduate students by permission of instructor. (Fall)

233 **Biology of Viruses** (2) Robbins, Huang

Biochemical and genetic characterization of viruses. Prerequisite: Micr 211 or equivalent. (Fall)

234 **Biology of Virsuses—Laboratory** (2) Robbins, Huang

Laboratory complement to Micr 233. Prerequisite or concurrent registration: Micr 233. Laboratory fee for nonmedical students, $20. (Fall)

235 **Systematic Bacteriology** (2) Hugh

History of bacterial classification, international rules of nomenclature as applied to bacteria, development of bacterial classification based on relationships, survey of characteristics of bacterial groups. Prerequisite: Micr 201 or 212; or equivalent. (Fall 1974 and alternate falls)

251 **Clinical Laboratory Bacteriology** (3) Hugh

(Formerly Bacteriology)

For medical students; open to graduate students. Detection and identification of bacterial agents which cause diseases in man. Comparative isolation and identification methods; emphasis on interpretation and significance of laboratory observations. Prerequisite: Micr 201 or equivalent. (Fall)

255 **Virology** (2) Huang, Robbins

Primarily elective course for medical students; open to graduate students. General principles of virology; emphasis on clinical situations. Prerequisite: Micr 201 or equivalent. (Fall)

257 **Experimental Immunochemistry** (3) Affronti

Biochemical and physiochemical characterization of antigens and antibodies. Prerequisite: Bioc 221–22 or equivalent, Micr 230. Laboratory fee for nonmedical students, $20. Limited enrollment. (Spring 197- and alternate springs)

258 **Microbial Genetics** (2) De Giovanni-Donnelly

Survey of microbial systems that depict basic concepts of genetic principles. Prerequisite: Micr 211 or equivalent. (Spring)

277–78 **Seminar: Microbiology** (1–1) Staff

Required of graduate students. (Academic year)

280 **Virology** (10) Huang, Robbins

Selected problems; library assignments, laboratory studies. 8-week elective periods.

281 **Biological Basis of Infections** (5) Affronti, Reich

Selected problems; library assignments, laboratory studies, term paper. 4-week elective periods.

282 **Immunology** (5) Staff

Selected problems, library assignments, laboratory research. 4-week elective periods.

283 **Bacteriology** (10) Hugh

Selected problems; library assignments, laboratory studies, term paper. 8-week elective periods.

284 **Microbial Genetics** (5) De Giovanni-Donnelly

Selected problems, library assignments, laboratory studies, term paper. 4-week elective periods.

285 ***In vitro* Study of Immune Responses** (10) Cha

Preparation of specific antigens from a cell strain and production of antibodies against this strain in appropriate mammalian host; identification of unknown cell types using tissue culture, serology, immunochemistry. 8-week elective periods.

289 **Inflammation, Immunity, and Hypersensitivity** (5) Affronti and Staff

4-week elective periods.

290 **Extramural Microbiology Elective** (arr.)

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department. Staff

293 **Special Topics in Microbiology** (arr.) (Fall, spring)

Selected topics in microbiology. May be repeated for credit.

295 **Research in Microbiology** (arr.) Staff
Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of philosophy candidates. May be repeated for credit. (Fall and spring)

Neurological Surgery

Chairman: H.V. Rizzoli

Professor H.V. Rizzoli
Clinical Professors J.M. Williams, H.H. Ammerman, Giovanni Di Chiro, G.J. Hayes, J.M. Van Buren
Professorial Lecturer K.M. Earle
Associate Professors J.L. Fox, T.H. Milhorat, C.B. Early
Associate Clinical Professors J.P. Murphy, N.H. Horwitz, Ruth Jakoby, A.N. Martins, W.T. Koos
Assistant Professors Emanuele Mannarino, D.R. Smith
Assistant Clinical Professors A.P. Hustead, F.D. Cooney
Assistant Professorial Lecturer A.E. Wentz
Instructor C.W. Campbell
Clinical Instructors R.A. Mendelsohn, J.W. Barrett, C.P.H. Carroll, J.A. Gulbrandsen, Jack Kushner

380 **Clinical Neurosurgery** (5) Staff
Clinical clerkship in neurosurgical service. Emphasis on neurologic examination; indications for special neurologic tests, e.g., arteriograms, pneumoencephalograms, etc.; and operative procedures. 4-week elective periods. Univ. Clinic

381 **Clinical Neurosurgery** (5) Martins
Participation in all departmental activities: ward rounds, daily conferences, radiographic and pathologic studies, operating room procedures; emphasis on studies of cerebral circulation. 4-week elective periods. Walter Reed Gen. Hosp.

382 **Clinical Neurosurgery** (5) Early
Participation in all departmental activities; ward rounds, daily conferences, radiographic and pathologic studies, operating room procedures. 4-week elective periods. Nat'l. Naval Med. Center

383 **Pediatric Neurosurgery** (5) Milhor

Participation in all departmental activities; ward rounds, daily confe ences, radiographic and pathologic studies, operating room procedures week elective periods. Children's Hosp.

385 **Clinical Neurosurgery** (5) Fo

Clinical clerkship includes experience with diagnostic procedures: arter grams, pneumoencephalograms, myelograms, and assisting in operat room; conferences and ward rounds. 4-week elective periods. V.A. Ho

387 **Clinical Neurosurgery** (5) Hornig

Participation in all departmental activities, including ward rounds, da conferences, radiographic and pathologic studies, and operating room pro cedures. 4-week elective periods. Wash. Hosp. Center

390 **Extramural Neurosurgery Elective** (arr.)

The Department arranges for students to spend elective periods in othe institutions. Interested students should contact the Chairman of the De partment.

Neurology

Chairman: Sean O'Reilly
Director of Encephalographic Laboratory: Sean O'Reilly

Professors Harold Stevens, Sean O'Reilly, M.J. Malone, Helen Hess
Clinical Professors R.H. Groh, W.K. Engel, P.L. Eichman
Professorial Lecturers K.M. Earle, N.P. Goldstein
Associate Professors Ann Barnet, D.J. Fishman
Associate Clinical Professors A.S. Dekaban, H.H. Schwamb, Antonio Stazio
Ntinos Myrianthopoulos, Karin Nelson
Assistant Professors W.H. Lawrence, M.M. Platt
Assistant Clinical Professors G.D. Weickhardt, Virginia Duggins, Cosimo
Ajmone Marsan, T.W. Kelly, A.D. Huott, Kristof Abraham, W.J. Hawes
Miryam Davis
Clinical Instructors M.C. Korengold, R.H. Robertson, E.C. Wilner, Howard
Silby, David Satinsky, B.H. Natelson, R.N. Edelson

380 **Clinical Neurology** (5) O'Reilly and Staff

Clinical clerkship in neurology. Emphasis on neurologic examination; in dications for special neurologic tests, e.g., arteriograms, pneumoencephalo grams, etc.; 4-week elective periods. Univ. Hosp.

382 **Pediatric Neurology** (5) Malone and Staff

Clinical clerkship in diagnostic study and care of inpatients and outpa tients; conferences and teaching sessions. 4-week elective periods. Chil dren's Hosp.

383 **Clinical Neurology** (5) Schwamb

Emphasis on neurological examination and basic sciences, including neuro

anatomy, as applied to clinical material. 4-week elective periods. Walter Reed Gen. Hosp.

386 **Clinical Neurology** (10) Goldstein

Clinical clerkship under close supervision of highly experienced clinicians and teachers. Trainees prepare histories and conduct physicals, attend rounds and conferences, assist in routine procedures. Abundant clinical material available. 8-week elective periods. Mayo Clinic

390 **Extramural Neurology Elective** (arr.)

The Department arranges for students electing a clerkship at the University Hospital to spend a further elective period in other institutions. Interested students should contact the Department of Neurology.

Obstetrics and Gynecology

Chairman: A.B. Weingold

Professors R.H. Barter, J.G. Sites, A.B. Weingold, Roy Hertz *(Research)*
Clinical Professors R.A. Chez, W.P. McKelway, M.P. Footer
Associate Professors **Benny Waxman, Larry McGowan**
Associate Clinical Professors W.T. Lady, J.W. Pearson, Jr., Shirley Martin, M.S. Kaufman, Donald Walters, J.M. Friedman, B.W. Richwine, Peter Soyster, T.A. Wilson, J.C. Walsh, W.H. Cooper, L.M. Liverett, N.J. Price, H.A. Donald, M.S. Burnhill
Assistant Professors **C.B. Jacobson, J.L. Marlow, J.B. Craft, Jr., Stanley** Marinoff, Michelle Warren
Assistant Clinical Professors **J.R. Epstein, S.H. Shea, G.L. Jarvis, H.P. Treich**ler, I.W. Rovner, M.W. Sandmeyer, Jr., N.M. Tart, R.B. Nelson, Louis Goldstein, George Speck, A.W. Winshel, **R.V. Erkenbeck, L.Q. Pugsley, H.L.** Kotz, O.I. Dodek, Jr., Julius Fogel, A.I. Robins, S.M. Belinsky, S.F. Stewart, Jr., W.F. Peterson, C.D. Crystle, C.R.A. Gilbert, R.J. Falk, Elizabeth Crisp, **G.R. Hewlett, Meyer Rosenbaum**
Instructor Bill Bunnag *(Cytology)*
Clinical Instructors A.S. Bright, E.F. Gahres, D.R. Carlson, E.E. Cunningham, Geraldine Paul, M.H. Hird, Josiah Sacks, R.F. Badwey, F.W. Titus, Jr., T.H. Gresinger, J.M. Close, E.R. Kolvereid, D.M. Margulies, J.C. Skilling, S.D. Cooley, L.E. Fettig, R.W. **Smith, W.D. Wallace, Jr., R.M. Regan**, B.A. Band, C.E. Townsend, D.H. Martin, W.R. Perkins, L.C. Radice, J.E. Anderson, A.A. de Moya, Erika Latchis, D.C. Meek, A.A. Becker, C.D. Lord, H.C. Beaver, Carlena Campbell, Melchior Savarese, David Davoudlarian, Marc Fialco, J.B. Credle, S.T. Lee, R.J. Pierce, C.I. Schneiderman, J.E. Alarcon, A.A. Greenfield, Jay Grodin, Raymond Gambrill III, Mabelle Cremer, T.A. Cook, Jr., M.J. Roberts, N.A. Carr, G.M. Kioko, Rita Rigor, Sharadchandra Shinde, E.G. Koch, Violet Hugh, Anna Van Rooy
Special Lecturers R.J. Clark, S.C. Booker, J.H. Niles

*303 **Clinical Obstetrics and Gynecology** (10) Staf
Participation in all obstetrical and gynecological clinics, daily departmental conferences and ward rounds at University, Fairfax, and Columbia hospitals. Manikin demonstrations of mechanism of labor and various types of operative delivery. (8-week periods throughout academic year)

351 **Introduction to Clinical Practice** (1) Jacobson
Introduction of first-year medical students to patient situations by members of the clinical staff. Designed to stimulate questions and discussion regarding physical, financial, and moral implications of medical practice. 25 students. Univ. Hosp. (Spring)

375 **Clinical Obstetrics and Gynecology and Family Planning** (5) Weingold, Waxman, McGowan
Participation in office practice of obstetrics and gynecology and family planning clinic. 4-week elective periods. Univ. Clinic

376 **Gynecologic Oncology and Cytopathology** (5) McGowan
Participation in all aspects of clinical inpatient and office diagnosis and treatment of women with gynecologic cancer; related research 4-week elective periods. Univ. Clinic

377 **Fetal Monitoring in Labor** (5) Waxman
Experience in application of fetal monitoring, accumulation and interpretation of data. Participation in intra-partum study of effects on the fetus of labor position, medication, and types of delivery. 4-week elective periods. Univ. Clinic

378 **Endocrinology, Clinical and Laboratory Applications** (5) Fuj
Clinical and laboratory approach to infertility and gynecological endocrinology. 4-week elective periods. Columbia Hosp.

379 **Clinical Obstetrics and Gynecology** (5) Sites, McKelway, Titus
Participation in office practice of obstetrics and gynecology. 4-week elective periods.

380 **Clinical Obstetrics and Gynecology** (5) Gahres, Radic
Participation in patient care, clinics, surgery, and delivery. 4-week elective periods. Alexandria Hosp.

381 **Clinical Obstetrics and Gynecology** (5) Cooper, de Moy
Participation in office practice of obstetrics and gynecology. Introduction to sexual therapy and counseling. 4-week elective periods.

382 **Clinical Obstetrics and Gynecology** (5) Pugsley, Cooke
Participation in office practice of obstetrics and gynecology. 4-week elective periods.

383 **Clinical Obstetrics and Gynecology** (5) Footer, Friedman
Participation in office practice of obstetrics and gynecology. 4-week elective periods.

385 **Clinical Gynecology** (5) Gahres
Case assignments, rounds and conferences, including tumor board, gyne-

* Required for medical students.

cologic pathology, preparation for surgery, attendance at surgery, postoperative care. 4-week elective periods. Wash. Hosp. Center

386 **Clinical Obstetrics and Gynecology** (5) Treichler, Price, Kolvereid

Participation in office practice of obstetrics and gynecology. 4-week elective periods.

387 **Inpatient Obstetrics and Gynecology** (5) Patow*

Supervised obstetrics and gynecology in a large military hospital; rounds and conferences. 4-week elective periods. Walter Reed Gen. Hosp.

388 **Clinical Obstetrics and Gynecology** (5) Price

Participation in all aspects of inpatient and outpatient obstetrical and gynecologic services; rounds, obstetrical-gynecologic conferences, gynecologic pathology conferences; Emergency Room consultations; instruction in obstetrical anesthesia. 4-week elective periods. Fairfax Hosp.

389 **Clinical Obstetrics and Gynecology** (5) Fabro

Participation in patient care, rounds, and conferences. 4-week elective periods. Columbia Hosp.

390 **Extramural Obstetrics and Gynecology Elective** (arr.)

The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

391 **Cytogenetics** (1) Jacobson

Clinical chromosomal anomalies in man, experimental design and data analysis in cytogenetics, two cytogenetics techniques, sex chromatin analysis, tissue culture procedures. Special students admitted with approval of instructor. (Fall 1974 and alternate falls)

392 **Reproductive Genetics** (1) Jacobson

For medical students; open to graduate students with permission of instructor. Lectures with guest speakers, covering current methodology. Emphasis on human infertility; clinical case presentation and review utilized whenever possible. Major topics: gametogenesis, *in vivo* gamete manipulation and fertilization, nidation, and selective factors in development. 15 2nd-year medical students. Univ. Hosp. (Fall)

395 **Gametogenesis** (1) Jacobson

For medical students; open to graduate students with permission of instructor. Seminar course with guest lecturers. Covers various clinical and experimental factors in gametogenesis. Emphasis on histogenesis of the gonads, environmental and clinical variables in infertility. 25 1st-year students. Univ. Hosp. (Spring)

399 **Medical Genetics** (1) Jacobson

Clinical examples of genetic disease. Emphasis on basic principles such as linkage, heterogenity, mutation, and pedigree inheritance. The goal of the course is to provide the knowledge and skills needed to diagnose, manage, and counsel common genetic disorders. (Fall 1974 and alternate falls)

* Dr. Patow is Chief of the Obstetrics and Gynecology Service at Walter Reed General Hospital.

Ophthalmology

Chairman: M.F. Armaly

Professor M.F. Armaly
Clinical Professors J.H. King, Jr., M.M. Parks, M.G. Alper, L.E. Zimmerman
Associate Professors B.S. Fine *(Research)*, M.O. T'so *(Research)*
Associate Clinical Professor L.M. King, Jr.
Assistant Professors D.S. Friendly, Dertad Manguikian, K.R. Rao, Jean Swartz *(Research)*, R.N. Sunga, Hanna Zakharia, Minoru Araki *(Research)*
Assistant Clinical Professors W.J. Romejko, W.P. Chalfant, Jr., R.E. duPrey, Robert Day, J.H. Lodge, W.B. Glew, J.T. Schwartz, K.A. Simon, H.A. Urweider, B.H. Zeavin, H.N. Bernstein, D.K. Berler, J.N. Goldman, A.L. Fjordbotten, W.S. Gilbert, H.S. Wicker, D.G. Albert, S.P. Ginsberg, M.H. Zimmerman, F.G. La Piana, Frederick Reeser, G.D. Rogell, J.F. O'Neill
Clinical Instructors J.R. Weimer, S.S. Pappas, Joanne Economon, R.S. Deutch, H.I. Rodman, George Liss, H.M. McAllister, L.E. Perraut, H.J. Starr, Leonard Kogan, J.F. Nowell, Bernard Ehrlich, D.L. Lanter, Richard Huberman, P.A. Dorn, Jr., E.M. Zimmerman, Joseph Snyder, B.S. Bruner, M.E. Lederman, L.E. Rothkoff, M.D. Krinn, Thomas Frey, Kenneth Somers, D.M. Wanicur, R.T. Lee, W.S.N. Ibrahim, Evadne Titer

281 **Ophthalmic Pathology I** (1) — L. Zimmerman
Basic science aspects of diseases of the eye. (Spring)

282 **Ophthalmic Pathology II** (3) — L. Zimmerman
Diseases of the eye as revealed by gross and microscopic examination. 8 students. Armed Forces Inst. of Path. (Spring)

284 **Ophthalmic Pathology III** (5) — L. Zimmerman
Daily participation in an active service limited to pathology of the eye and its adnexa. Inflammatory, degenerative, and neoplastic diseases comprise the major categories. 4-week elective periods. Armed Forces Inst. of Path.

*302 **Ophthalmology** (OPD)(1) — Lodge and Staff
Clinical instruction in external examination of the eye; tonometry and funduscopy. Use of ophthalmological instruments. (Fall)

380 **Clinical Ophthalmology** (5) — Lodge
Students will observe all types of eye conditions in ambulatory and hospitalized patients. 4-week elective periods. Wash. Hosp. Center

381 **Clinical Ophthalmology** (5) — Armaly and Staff
Introduction to clinical ophthalmology, demonstration of the methodology involved in eye examination, detection of normal and abnormal findings, and participation in outpatient and inpatient medical and surgical care. Lectures, seminars. 4-week elective periods. Univ. Clinic

382 **Research in Ophthalmology** (20) — Armaly
16-week elective periods. Warwick Bldg.

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* Required for medical students.

390 **Extramural Ophthalmology Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

Orthopaedic Surgery

Chairman: J.P. Adams
Associate Chairman: H.L. Feffer

Professors J.P. Adams, H.L. Feffer, Fred Leonard *(Research)*, D.W. McKay, R.S. Snell
Clinical Professors J.S. Neviaser, L.T. Peterson, Charles Keck
Associate Professors P.I. Kenmore, R.J. Neviaser
Associate Clinical Professors R.L. Dow, Byron Genner III
Assistant Professors W.P. Fortune, S.S. Haas, M.T. Freedman, H.O. Goller *(Research)*
Assistant Clinical Professors G.J. Schonholtz, G.I. Baker, S.H. Eisenberg, G.P. Bogumill, K.A. Peterson, L.A. Ottenritter, H.S. Cattell, B.P. Vitek, C.W. McCutchen *(Biomechanics)*, A.I. Dobranski, Stanford Lavine, M.A. Schultz, Ulla Fortune, L.J. Micheli
Clinical Instructors Ronald Ottenberg, Richard Conant, J.W. Harvey, R.M. Ackerman, R.J. Heilen, B.P. Gibbons, C.C. Liu, F.R.T. Nelson, J.A. Lewis, T.J. Neviaser, Michael Passaretti, R.L. Gaertner, Robert Loeffler

*302 **Clinical Clerkship in Orthopaedic Surgery**
2 weeks at the Univ. Hosp.

380 **Orthopaedic Surgery** (5) — **Adams and Staff**

Rotating program: one week of adult orthopaedics at University Hospital; one week of children's orthopaedics at Children's Hospital; one week of general orthopaedics at Walter Reed General Hospital, Andrews Air Force Base Hospital, or National Naval Medical Center. 4-week elective periods.

381 **Orthopaedic Surgery** (5) — **Kenmore**

Participation in total care program of orthopaedic patients: daily rounds, conferences, seminars. 4-week elective periods. V.A. Hosp.

382 **Research in Orthopaedic Surgery** (arr.) — **Leonard, Adams**

383 **Sports Medicine** (arr.) — **Haas, Lavine**

Introduction to athletic injuries, including prevention and management. Interested students should contact Dr. Haas.

390 **Extramural Orthopaedic Surgery** (arr.)

The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

*Required for medical students. Credit is a part of and is assigned after completion of Surg 303.

395 **Research in Orthopaedic Surgery** (5, 10,15, or 20) Leonard
4-, 8-, 12-, or 16-week elective periods. Univ. Hosp.

Otolaryngology

Chairman: J.J. McFarland, Jr.

Associate Clinical Professors J.J. McFarland, Jr., Max Fischer
Assistant Clinical Professors J.L. Levine, M.E. Krucoff, R.S. Page, Jr., J.A. Sabri, W.M. Trible, B.M. Webb, R.E. Pumphrey, Jr., D.N.F. Fairbanks
Clinical Instructors I.S. Jaffee, R.D. Ralph, H.H.E. Scheidemandel, G.F. Miller, Jr., Stephen Epstein, R.J. Bobys, Daniel Isaacson, B.A. Feldman, H.C. Stern, N.L. Barr, Jr., Barry Modlin, Allen Small

380 **Otolaryngology** (5 or 15) McFarland
Care of inpatients and outpatients, diagnosis, and therapy; rounds and conferences. 4- or 12-week elective periods. Wash. Hosp. Center

390 **Extramural Otolaryngology Elective** (arr.)
The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

Pathology

Chairman: T.M. Peery

Professors T.M. Peery, F.N. Miller, Jr., William Newman, J.C. Smith, B.H. Smith, Mary Matthews, Mario Werner *(Laboratory Medicine)*, M.J. Valaske, G.H. Reifenstein
Clinical Professors L.E. Zimmerman *(Ophthalmic)*, J.M. Blumberg, E.B. Helwig *(Dermatologic)*, N.S. Irey, Robert Sauer *(Comparative)*, Cornelia Hoch-Ligeti, J.L. Luke *(Forensic)*, C.F. Bishop *(Laboratory Medicine)*, R.S. Melville *(Laboratory Medicine)*
Professorial Lecturers P.D. Olch *(History of Medicine)*, Tatiana Antonovych
Associate Professors W.L. Marsh, Lois Platt *(Emeritus)*, Alexander Breslow, F.S. Jannotta, L.S. Lessin *(Hematology)*, W.A. Burns, R.B. Lingeman, Jr., mal Saini, M.F. Dolan *(Hematology)*, D.S. O'Leary *(Laboratory Medicine)*
Associate Clinical Professors V.E. Martens, R.E. Palmer, W.J. Jaffurs, M.A. Weinberger, C.B. Cook, H.A. Schwamm, A.D. Cramer *(Blood Banking)*, F.B. Johnson, H.J. Norris
Assistant Professors S.G. Kent, Suzanne Hammersberg *(Medical Technology)*, B.C. Zook *(Comparative)*, J.G. Guccion, Jocelyn Hicks, F.P. Abramson, Research), Patsy Robinson *(Microbiology)*, M.H. Fusillo *(Laboratory Medicine)*, P.A. Lindsay *(Laboratory Medicine)*, J.A. Zeller *(Laboratory Medicine)*, Jemionek *(Clinical Chemistry)*, J.W. Eastman *(Laboratory Medicine)*

Assistant Clinical Professors W.F. Enos, Marjorie Williams, D.R. Parkinson, I.D. Godwin, F.M. Garner *(Comparative)*, Gloria Brennan, F.R. Robinson *(Comparative)*, Anne Baumhofer *(Clinical Microbiology)*, J.W. Howell *(Clinical Chemistry)*, B.D. Blackbourne *(Forensic)*, M.B. Furlong, Jr. *(Laboratory Medicine)*, B.J. Pearson *(Laboratory Medicine)*

Clinical Instructors C.R. Lissner *(Clinical Microbiology)*, M.L. Pratt *(Blood Banking)*, Milo Prodanovich *(Clinical Chemistry)*, R.L. Dixon *(Hematology)*, H.A. Shulman *(Laboratory Medicine)*, Linda Christoffersen *(Laboratory Medicine)*

Special Lecturers L.C. Johnson, R.S. Chandra

*11 **Clinical Chemistry** (9) Staff

Blood chemistry: principles and techniques of analysis; toxicology, emphasizing drugs of abuse and environmental poisons; urinalysis; quality control in clinical chemistry. Prerequisite: Chem 9 or 11 or equivalent.

*12 **Clinical Microbiology** (12) Staff

General bacteriology, with emphasis on identification of pathologic microorganisms by morphologic and cultural methods; immunology and serology stressing basic principles and techniques used in diagnostic studies; parasitology, especially identification of parasites and insects that may affect man; quality control in clinical microbiology.

*13 **Hematology** (6) Staff

Basic hematologic procedures, diagnosis of abnormalities of cellular elements of blood and bone marrow, studies in blood coagulation, quality control in clinical hematology.

*14 **Blood Banking** (6) Staff

Principles of immunohematology, blood donor center techniques, blood processing techniques, quality control in blood banking.

*15 **Clinical Laboratory Rotation** (12) Staff

Instructions in laboratory technique, stressing the application of theories and principles of clinical chemistry, clinical microbiology, hematology, and blood banking in the day-to-day operations of the modern clinical laboratory.

*115–16 **Introduction to Medical Science** (1–1) Marsh, Hammersberg, and Staff

Lectures on physiology, pathology, and medicine to accompany Path 117–18. (Academic year)

†117–18 **Principles in Medical Technology** (4–4) Marsh, Hammersberg, and Staff

Theories, principles, sources of error of methods used in clinical chemistry, clinical bacteriology, serology, hematology, clinical microscopy. (Academic year)

*119–20 **Medical Technology Laboratory** (10–10) Marsh, Hammersberg, and Staff

Rotation through University Hospital pathology laboratories: hematology

* Limited to students in the off-campus program leading to the degree of Associate in Science with a concentration in Medical Laboratory Technique.
† Limited to candidates for the degree of Bachelor of Science in Medical Technology

and urinalysis, 12 weeks; chemistry, 16 weeks; bacteriology and parasitology, 12 weeks; blood bank, 6 weeks; serology, 4 weeks. (35 hours a week for 50 weeks)

*201 **Pathology** (8)
A year course; required for 2nd-year medical students. General introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies.

202 **Diagnostic Conferences** (1) Jannotta, Gusso
Case studies demonstrating pathologic significance of major clinical symptoms and physical signs. (Spring—1 hour a week)

203–4 **Pathology** (4–4)
For graduate students. General introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies. Limited enrollment. Prerequisite to Path 204: Path 203. (Academic year)

†205 **Comparative Pathology I** (3)
An introduction to the study of disease in vertebrates, comparison with disease in man. Mechanisms by which various agents provoke illness; body defensive reactions. Illustration of common diseases of various species, including material from captive wild animals. Recommended: courses in anatomy, histology, and physiology. (Fall)

‡210 **Comparative Pathology Laboratory** (2) Zook, Sauer, Garner
Special assignments for dissection and study, including study of common diseases of captive wild animals. Path. Lab., Nat'l. Zoological Park (Fall—6 hours a week)

212 **Pulmonary Pathology** (1)
Basic disease processes reviewed and expanded upon. Lectures, case presentations, and group discussions, with correlation of clinical, radiological, and pathological changes. V.A. Hosp. (Spring—2 hours a week for 8 weeks)

214 **Diseases of the Liver** (1)
The most important liver diseases, using the liver biopsy as the focal point. Clinical summary and microscopic findings, including electron microscopy where useful. V.A. Hosp. (Spring—2 hours a week for 8 weeks)

‡215 **Perinatal Pathology Laboratory** (2)
Special assignments for dissection and study. Univ. Hosp. hours a week)

216 **Necropsy Pathology** (2)
Review of current necropsy cases stressing interpretation of clinical symptoms and signs and radiographs on the basis of gross changes in the organs. V.A. Hosp. (Spring—2 hours a week)

252 **Forensic Pathology and Medical Jurisprudence** (1)
Somatic death, coroner and medical examiner systems, pathology of physical and chemical injuries, medical licensure; the physician-patient relationship and professional liability are discussed. (Spring—1 hour a week)

* Required for medical students
† An interdepartmental course offered by the departments of Pathology and Biological Sciences
‡ Open to limited number of graduate students, with permission

253 **Medicine in Shakespeare** (1) **Miller**

Seminars with student and staff presentations covering the plays of William Shakespeare of medical significance. (Spring—1 hour a week)

254 **Medicine in Literature** (1) **Miller**

Series of discussions with student and staff presentations covering novels, dramas, nonfiction, and poetry of medical significance. (Fall—1 hour a week)

260 **Obstetric and Gynecologic Pathology** (1) **Jaffurs**

Organ changes in normal and abnormal pregnancy, including both the mother and the fetus. Diseases of female genital system. (Spring—1 hour a week)

*266 **Comparative Pathology II** (1) **Sauer, Zook**

Participation in an autopsy service involving wild animals in captivity and comparison of diseases in various animal species with those in man. Limited to 4 students. Path. Lab., Nat'l. Zoological Park (Fall—four 3-hour sessions)

*271 **Tissue Reactions to Drugs** (1) **Irey**

Study of the problems involved in recognizing instances of untoward reaction to therapy. Case presentations. (Spring—1 hour a week)

*277 **Anatomic Pathology Clerkship I** (arr.) **Staff**

A practical course in gross human anatomy and pathology. Prerequisite: Anat 201 or equivalent. Students spend up to 24 weeks full-time on the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week period. Univ. and V.A. Hosps.

279 **Ophthalmic Pathology I** (1) **Zimmerman**

Basic science aspects of diseases of the eye. (Spring—1 hour a week)

280 **Surgical Pathology I** (4) Newman, Matthews, Palmer, Schwamm

Surgical pathology service at participating hospitals. Examining specimens from current surgical cases, correlating with clinical manifestations. Univ., V.A., Alexandria, and Andrews AFB hosps. (Spring—6 hours a week)

*281 **Anatomic Pathology Clerkship II** (arr.) **Staff**

A practical course in gross and microscopic human pathology. Prerequisite: Path 201 or equivalent. Students spend up to 24 weeks full-time, or the equivalent part-time, on the necropsy and surgical pathology services, receiving 1 semester hour of credit for each 4-week full-time period. Univ. and V.A. hosps. (Spring)

282 **Ophthalmic Pathology II** (3) **Zimmerman**

Diseases of the eye as revealed by gross and microscopic examination. Concurrent registration for Path 279 required. 6 students. Armed Forces Inst. of Path. (Spring—4 hours a week)

*283 **Anatomic Pathology Clerkship III** (arr.) **Staff**

Necropsy and surgical pathology service. Prerequisite: Path 201 or 203–4. Graduate students receive 5 semester hours of credit for each 4-week period and may receive up to 30 semester hours of credit for 6 months full time. Medical students receive 5 semester hours of credit for each 4-week

* Open to limited number of graduate students, with permission.

elective period. (Medical students: 4- or 8-week elective periods. Graduate students: fall or spring)

284 **Ophthalmic Pathology III** (5) Zimmerman

Daily participation in service limited to pathology of the eye and its adnexa. 4-week elective periods. Armed Forces Inst. of Path.

285 **Clinical Pathology** (5) Martens

Selected techniques of clinical chemistry, hematology, bacteriology. Student selects laboratory problem. 4-week elective period. Wash. Hosp. Center

286 **Perinatal Pathology** (5) Kent

Participation in perinatal (fetal and newborn) necropsies. Study of selected teaching cases. Examination of selected placentas for disease. 4-week elective periods. Univ. Hosp.

287 **Immunohematology and Blood Banking** (5) Marsh

Preparation and use of blood and blood products in surgery and in blood diseases, studied from the laboratory as well as the clinical viewpoint. Emphasis on management of acute clinical situation. 4-week elective periods. Univ. Hosp.

288 **Clinical Pharmacology and Toxicology** (5) Abramson

Correlations of therapeutic drug levels in hospitalized patients and outpatients with their clinical status. Evaluation of rational dosage schedules. Development and application of clinical laboratory methods for determination of drug levels. 4-week elective periods.

289 **Clinical and Anatomical Pathology** (5) Cook

Daily studies of surgical and necropsy pathology, including forensic pathology; clinical pathology projects, including hematology, isotopology, bacteriology. 4-week elective periods. Fairfax Hosp.

290 **Extramural Pathology Elective** (arr.)

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

291 **Clinical and/or Anatomical Pathology** (5) B. Smith

Students will have an opportunity to explore in depth a topic of interest to them in the field of pathology; library study. 4-week elective periods. V.A. Hosp.

292 **Histochemistry: Chemical Composition and Enzyme Activity of Human Tissues** (5) Hoch-Ligeti

Histological demonstration of chemical constituents and enzymatic activities in cells and tissues and their use in diagnostic anatomical pathology. Opportunity for employing fluorescence, interference, and scanning microscopes. Limited participation in routine work in clinical and anatomical pathology. Room and board furnished. 4-week elective periods. V.A. Center, Martinsburg, W.Va.

293 **Clinical and Anatomical Pathology** (5) Palmer

Participation in departmental activities, including clinical chemistry, blood bank, microbiology, and hematology; surgical pathology; autopsy pathol-

ogy, including medico-legal autopsies. 4-week elective periods. Alexandria Hosp.

294 **Forensic Pathology** (5) Luke

Participation in the activities of the Office of the Chief Medical Examiner of the District of Columbia: observation of scene investigation, participation in medico-legal autopsies, attendance at court trials, etc. 4-week elective periods. Office of the Chief Medical Examiner

*295 **Comparative Pathology III** (arr.) Robinson, Zook, Sauer

Participation in veterinary pathology service, including wild and domestic animals. Prerequisite: Path 201 or 203–4, and 283. Graduate students receive 5 semester hours of credit for each 4-week period and may receive up to 30 semester hours of credit for 6 months full time. Medical students receive 5 semester hours of credit for each 4-week elective period. (Medical students: 4-week elective periods. Path. Lab., Nat'l. Zoological Park, and Armed Forces Inst. of Path. Graduate students: fall or spring)

296 **Surgical Pathology II** (5) Newman

Evaluation of surgical specimens and correlation with clinical status of patient, description of gross and microscopic findings on assigned cases. 4-week elective periods. Univ. Hosp.

297 **Dermal Pathology** (5) Helwig

Microscopic conferences, review of current material and study sets. 4-week elective periods. Armed Forces Inst. of Path.

298 **Necropsy Pathology** (5) J.C. Smith

Organ changes in disease, gross and microscopic examinations, preparation of protocols. 4-week elective periods. Univ. Hosp.

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Pharmacology

Chairman: H.G. Mandel

Professors H.G. Mandel, V.H. Cohn, Jr., Paul Mazel, S.E. Fabro *(Research)*, E.B. Truitt, Jr. *(Research)*, Roy Hertz *(Research)*
Professorial Lecturers F.E. Hahn, Julius Axelrod
Associate Professors K.S. Kim *(Research)*, J.A. Straw, Philip Klubes

*Open to limited number of graduate students, with permission.

Assistant Professors G.S. Edwards, F.P. Abramson *(Research)*, H.C. Harder, J.W. Dailey, E.W. Sutherland III, Dominique Pessayre *(Research)*, Mohammad Shahvari
Special Lecturer P.J. Creaven

21–22 **Chemistry and Physics of Anesthesia** (3–3) Mazel and Staff
For students in Nurse Anesthetist programs. Fundamental concepts of physics; general chemistry, organic chemistry, and biochemistry and their application to medicine and anesthesiology, including chemistry of respiration, acid-base balance, clinical biochemistry and enzymology, hormones, radioisotopes, electronics, physicochemical properties of anesthetic agents, and other related topics. (Academic year)

110 **Pharmacological Basis of Anesthesia** (3) Mazel and Staff
For students in Nurse Anesthetist programs. Fundamental principles of pharmacology; drugs affecting the autonomic nervous system, central nervous system, and cardiovascular system; fundamentals of inhalation anesthesia; auxiliary drugs used in anesthesiology; other topics. (Spring)

115 **Drug Abuse Education** (3) Cohn and Staff
Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems, legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana, hallucinogenic and psychedelic drugs. (Fall and spring)

120 **Readings in Pharmacology for Anesthesia** (arr.) Staff
For students in Nurse Anesthestist programs. Assigned reading in anesthesia and related areas; preparation of reports.

130 **Seminar: Accessory Drugs in Anesthesia** (2) Staff
For students in Nurse Anesthetist programs. Presentation of the pharmacology and pharmacodynamics of accessory anesthetic drugs; emphasis on those areas not covered in Phar 110.

201 **Pharmacology** (8) Mandel and Staff
A year course; required for 2nd-year medical students. Lectures, laboratory, conferences on interaction of drugs and biological systems as a basis for rational therapy of disease. Prerequisite: biochemistry and physiology.

203 **Fundamental Principles of Pharmacology** (2) Staff
Basic principles of pharmacology, including drug-receptor interactions, structure activity relationships, pharmacokinetics, membrane phenomena, cellular control mechanisms, drug toxicity. (Fall)

205–6 **Pharmacology** (4–4) Mandel and Staff
For graduate students. Lectures, laboratory, conferences on interaction of drugs and biological systems as a basis for rational therapy of disease. Prerequisite to Phar 205: biochemistry and physiology, or approval of Department. Prerequisite to Phar 206: Phar 205. (Academic year)

215 **Adolescent Drug Abuse** (3 or 4) Cohn and Staff
Not open to medical students. Offered off campus through the College of General Studies. Primarily for teachers, counselors, and school administrators. Multidisciplinary lectures and discussions concerning the physi-

logical and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, marijuana, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse. (Fall and spring)

216 **Drug Abuse Education Techniques** (3) Cohn and Staff

Not open to medical students. Offered off campus through the College of General Studies. Primarily for teachers and counselors preparing to direct drug abuse education programs. Intensive review of current information on drug abuse, dynamics of group process, supervised practical experience. Prerequisite: Phar 215 and permission of instructor.

225 **Treatment of Narcotic Dependence** (arr.) Cohn

Students work on a one-to-one basis with a physician/psychiatrist in the treatment of drug dependence at the Narcotic Treatment Administration, the V.A. Hospital, or the Psychiatric Institute of Washington, D.C.

252 **Seminar: Clinical Pharmacology** (2) Staff

Principles of experimental design for the evaluation of drug efficacy and safety in man. Problems in therapeutics; emphasis on drugs used in treatment of cardiovascular and infectious diseases. Enrollment limited. (Spring 1976 and alternate springs)

254 **Frontiers in Pharmacology** (1) Mazel and Staff

For medical and graduate students. Recent advances and fields of research in pharmacology. Presentations by laboratory scientists from neighboring institutions. (Spring)

256 **Molecular Pharmacology** (2) Hahn

For medical and graduate students. Current theory on action of drugs, especially chemotherapeutic agents, at molecular level. Effect of drugs on biosynthetic processes of the cell with respect to DNA, messenger RNA, transfer RNA, ribosomes, protein, cell wall, and intermediary metabolites. Factors which alter action of drugs, such as drug interactions and resistance. (Spring)

258 **Cancer Chemotherapy** (1) Mandel and Staff

For medical and graduate students. Mechanisms by which drugs inhibit the growth of tumor cells. (Spring 1976 and alternate springs)

259 **Developmental Pharmacology** (1) Staff

For medical and graduate students. Lectures, seminars, conferences. Teratogenic actions of drugs; pharmacological principles which apply during prenatal and perinatal development. (Spring 1976 and alternate springs)

260 **Endocrine Pharmacology** (1) Staff

For medical and graduate students. Lectures and seminars on recent advances in the pharmacology and mechanism of action of various harmones. (Spring 1975 and alternate springs)

267 **Pharmacological Research** (arr.) Staff

For graduate students. Research with staff members. May be repeated once for credit toward a Master of Science degree. (Fall and spring)

269 **Pharmacology Seminar** (1) Staff

For graduate students. Recent advances in pharmacology. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

272 **Physiological Disposition of Drugs** (3) Cohn

For medical and graduate students. Fate of drugs in biological tissue. Absorption, distribution, chemical alteration, excretion of drugs; physicochemical, and biological factors affecting these processes. Prerequisite: Phar 201 or 205–6. (Spring 1976 and alternate springs)

275–76 **Advanced Topics in Pharmacology I–II** (1–1) Staff

Lectures and seminars on advances in mechanisms of drug action, pharmacology of new drugs, theoretical aspects of pharmacology, laboratory techniques. (Academic year 1975–76 and alternate years)

277–78 **Advanced Topics in Pharmacology III–IV** (1–1) Staff

Continuation of Phar 275–76. (Academic year 1974–75 and alternate years)

279 **Special Topics in Pharmacology** (arr.) Staff

Selected aspects of drug action. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

281 **Physiological Techniques in Pharmacology—Lecture** (2) Mazel, Straw

For medical and graduate students. Physiological techniques for obtaining information on mechanism and site of action of pharmacological agents. Phar 281 may be taken without 282. Prerequisite: Phar 201 or 205–6. (Spring 1976 and alternate springs)

282 **Physiological Techniques in Pharmacology—Laboratory** (2) Mazel, Straw

Accompanies Phar 281. Prerequisite: Phar 201 or 205–6. Prerequisite or concurrent registration: Phar 281. (Spring 1976 and alternate springs)

283 **Biochemical Techniques in Pharmacology** (arr.) Edwards, Cohn

For graduate students. Lecture and laboratory. Theory and practice of modern biochemical techniques applicable to study of metabolic fate and mechanism of action of drugs. Prerequisite: Phar 205–6. (Summer

285 **Readings in Pharmacology** (1) Mazel

For medical students. Assigned reading and preparation of report. (Fall and spring)

286 **Research in Pharmacology** (arr.) Staff

For medical students. Participation in experimental studies in pharmacology, particularly bacterial chemotherapy, cancer chemotherapy, or drug metabolism. (Fall and spring)

287 **Readings in Drug Abuse Literature** (1) Cohn, Klubes

Both professional and nonprofessional literature in the general area of drug dependence. Informal monthly luncheon discussions. (Spring

295 **Reading and Research** (arr.) Staff

Independent study for students preparing for the Master of Science degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Physiology

Chairman: R.A. Kenney

Professors C.S. Tidball, R.A. Kenney, Elizabeth Tidball, Marie Cassidy
Professorial Lecturer Leonard Laster
Associate Professors M.J. Jackson, Michael McCally
Assistant Professors R.A. Lavine, D.W. Watkins
Assistant Professorial Lecturers I.P. Weiss, E.A. Steane
Special Lecturer L.L. Langley

Departmental prerequisite: Phyl 201 or equivalent is prerequisite to all courses in Physiology numbered above 201.

115 **Physiology for Nurse Anesthetists** (3) Staff

For students in Nurse Anesthetist programs. Emphasis on respiratory, cardiovascular, and autonomic nervous system physiology; a more general survey of other systems.

191 **Selected Topics in Human Structure and Function** (3) Kenney

Lecture (2 hours), laboratory (1 hour). Structural and functional basis of physiology. A required course for graduate students who have not had Anat 201 or equivalent. An undergraduate course; students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: BiSc 11–12 or equivalent and consent of instructor. Open to Columbian College of Arts and Sciences students with the approval of the student's major adviser. (Fall)

201 **Physiology** (8) Staff

Lecture (8 hours), laboratory (2 hours), conference (1 hour). Cellular, organ system, and applied mammalian physiology. Prerequisite for graduate students: Anat 201 or Phyl 191, or equivalent; Bioc 201 or 221–22 (Bioc 222 may be taken concurrently); or consent of Chairman of Department. Open to Consortium students only with permission of Department Chairman. (Spring)

[a] Required for medical students, open to graduate students.

211 **Cell Biology** (2) Staff

For graduate students. Same as Anat 211 and Idis 211. An integrated survey of the structure, function, and metabolism of the cell, as an introduction to the medical sciences.

212 **Neurobiology** (3) Staff

For graduate students. Same as Anat 212 and Idis 212. An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstration, and laboratory. Laboratory fee, $25.

221 **Seminar** (1) Cassidy

Staff and student presentations from literature. Present work discussed, experimental design and scientific deduction evaluated. Topics to be announced. Prerequisite: a reading knowledge of French or German. Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

251 **History of Medicine** (1) E. Tidball

Survey of the great contributors to physiology and medicine in the context of the times in which they lived and worked. (Fall)

252 **Physiological Basis of Sexuality** (2) C. Tidball, E. Tidball

Conference and discussion on topics including communication, psychosexual development, physiological responses, homosexuality, population control and family planning, fertility and sterility, and other topics of interest to the class. (Fall)

253 **Physiology of Fluid Balance and Hydrogen Ion Regulation** (2) Staff

Discussion on principles of fluid and acid-base balance and the application of these principles to specific situations. (Fall)

261 **Gastrointestinal Physiology** (1 or 2) Jackson, Dobbins

Weekly seminar: role of basic sciences in gastroenterology: intra- and extra-mural speakers. An approved paper required for 2 semester hours of credit. May be repeated for credit. (Fall and spring)

262 **Topics in Cardiovascular Physiology** (2) Kenney

Survey, at an advanced level, of aspects of cardiovascular physiology especially as interrelated with the respiratory and renal systems. (Fall)

265 **Review of Endocrinology** (1) Jackson

Review of basic endocrinology. (Fall)

266 **Advanced Endocrinology** (2) Jackson

Review at advanced level of selected topics in endocrinology and metabolism. Concurrent registration in Phyl 265 required. (Fall)

267 **Renal Physiology** (2) Kenney

Lecture or conference 2 hours a week. Overview of renal physiology at advanced level.

268 **Computer Utilization in Physiology and Medicine** (2) C. Tidball

Lecture 1 hour a week, practical experience at student's convenience. Orientation to digital and analog mini-computers. Programming in several

languages. Experience with one or more computers. No previous computer experience necessary. (Fall)

269 **Neurophysiology and Control Mechanisms** (2) Lavine

Selected topics in contemporary neurophysiology, including methods of data collection and analysis, control mechanisms involved in movement and behavior and sensory processing. Open to students in the School of Engineering and Applied Science with permission of instructor. (Fall)

282 **Experimental Physiology** (5) Staff

Participation in an ongoing research program in the Department. Programs are currently available in the areas of membrane physiology, intestinal transport, neurophysiology, and cardiovascular physiology. 4-week elective periods.

284 **Advanced Physiology** (5) Staff

Guided study and/or laboratory experience at an advanced level in a subfield of physiology. Prior arrangements should be made with the individual faculty member. 4-week elective periods.

290 **Extramural Physiology Elective** (arr.)

The Department arranges for medical students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

295 **Research** (arr.) Staff

By special arrangement with individual Staff members. Approximately 4 clock hours in the laboratory for each semester hour of credit. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

298 **Comprehensive Physiology** (arr.) Staff

Guided review of selected areas of Physiology appropriate to the student's graduate program. This course satisfies the requirements for the Master's Comprehensive Examination, the Field Examination for doctoral students minoring in Physiology, and Part I of the Cumulative General Examination. Prerequisite or concurrent registration: Phyl 221. (Fall)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

396 **Advanced Reading and Research** (2) Staff

Limited to students preparing for the Doctor of Philosophy general examination. Tutorial literature survey of a subfield of Physiology and of pertinent areas of the candidate's minor field. This course satisfies the requirement for Part II of the Cumulative General Examination in Physiology. (Fall and spring)

397 **Development of Dissertation Problem** (2) Staff

Limited to students preparing for the Doctor of Philosophy general examination. Preparation for written and oral presentation of dissertation problem. This course satisfies the requirement for Part III of the Cumulative General Examination in Physiology. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Psychiatry and Behavioral Sciences

Chairman: T.G. Webster

Professors Leon Yochelson, R.S. Lourie, J.E. Rankin, T.G. Webster, E.A. Har-
grove, R.L. Shapiro

Clinical Professors D.C. Cameron, T.D. Noble, Sidney Berman, **Morris Klein**-
erman, M.deG. Ruffin, Norman Taub, Samuel Yochelson *(Criminal Behav-*
ior), D.L. Bazelon *(Socio-legal Aspects)*, Leon Ferber, Paul Gray, Paul Cho-
doff, H.A. Meyersburg, F.N. Waldrop, Stanley Yolles, Harold Weiner *(Ex-*
perimental Psychology), Harvey Resnik, S.N. Kieffer, Leopold Bellak, J.D.
Noshpitz, William Stark, Bertram Brown, H.H. Work, Hilliard Jason, Leo
Cytryn, E.I. Kushner, John Kafka, Milton Meltzer, Jeanne Spurlock, Mar-
tin Katz

Professorial Lecturers **W.E. Barton, H.D. Lederer**

Associate Professors Rebecca Rieger *(Research)*, H.M. Grigorian, R.M. Cole-
man, G.E. Morris *(Allied Health)*, J.J. McMillan *(Psychology)*, W.H. Scott,
John Zinner

Associate Clinical Professors H.P. Laughlin, I.H. Kaiser, **C.T. Bever, David**
Eden, S.I. Szara *(Psychopharmacology)*, Hans Weil-Malherbe *(Neurochemis-*
try), J.G. Rubin, E.S. Fleming, R.M. Greenberg, W.D. Kehne, J.L. Sheridan,
J.H. Yacoubian, Jack Durell, Bennett Olshaker, H.B. Lehrman, I.H. Marti
T.D. Reynolds *(Experimental Psychiatry)*, P.S. Weisberg, C.J. Frederick
(Medical Psychology), L.D. Robinson, A.S. Abraham, Joseph Baker, J.J.
Francis, Angelo D'Agostino, W.J. Stockton, Roger Peele, J.T. Quattlebaum,
D.D. Cowell, M.R. Haas, Robert Dupont, Jr., David Reiss, Ayres D'Costa,
Bryant Wedge, P.F. Wohlford, J.H. Menetrez, B.L. Burris, C.C.H. Cullander,
D.L. Tippett, Archibald Ward, Jr. *(Sociology)*, H.S. Winston, J.E. Meeks,
Joseph Smith

Assistant Professors Jean Vazuka, Carolyn Robinowitz, **B.B. Doyle, S.L. Gow-**
man, J.A. Frank, Jr.

Assistant Clinical Professors Sarah Tenenblatt, R.A. Rogers, J.A. **Farrell, N.C.**
Rintz, F.G. Hilkert, I.D. Milowe, W.C. Johnson, R.A. Frank, Leslie Schaffer,
A.H. Kiracofe, Jr., T.M. Mackenzie, R.N. Butler, Christine Kehne, M.A.
Woodbury, W.H. Young, Jr., J.H. Bouma, Spencer Gordon, Jr., W.I. Tay-
lor *(Experimental)*, D.A. Lanham, Stephen Mourat, S.L. Auster, H.A. Green-
berg, Gertrude Cotts, Margaret Garrett, H.A. Hoffman, J.M. Post, Fran
Friedman, R.A. McElroy, Frances Thomas *(Social Work)*, W.G. Tompkins,
Brian Crowley, B.P. McKaig, William Davidson, J.A. Schoettler, Stephe
Weissman, M.S. Glatt, A.E. Marans, Elma Denham, Pearl Holly, D.H. Mc
Knew, Jr., L.A. Cove, Milton Engel, J.L. Evans, Larry Dizmang, Barr
Pakull, C.R. Gray, M.J. Chalick, Geraldine Schaeffer, R.T. Lewit, A.W.
Messore, W.F. Weber, R.W. Wadeson, Jr., M.T. Advani, Edward Black
D.H. Fram, A.B. Zients, M.J. Stern, G.A. Tripp, Michael Brody, Dav
Grodsky, J.L. Hatleberg, K.L. Kaplan, D.D. Pollock, **Armando Saenz, Ele**
nor Sorrentino, Lovisa Tatnall, Edith Taylor, S.J. Wolin, Stanley Greenspan
R.L. Fisher, Barton Kraff, D.Y. Patterson, J.D. Robinson *(Psychology)*, M
anne Goldberger, P.J. Steinglass, G.L. Adams, D.J. Gardner, R.I. Gross, J.
Wellhouse, S.C. Ettenson, J.W. Voell, D.P. Kraft, Jocelyn Malkin, S.
Ratner, D.R. Meers, F.J. Stoddard, S.H. Lipsius, Barry Landau, A.H. Ste

L.R. Conte, B.L. Frankel, P.A. Lange, Elvin Mackey, Jr., N.A. Schweig, S.L. Billet, J.C. Chatel, K.P. Goreliek, Robert Hirschfeld, Harvey Steinberg, R.C. Bristol, R.M. Costell, M.D. Fitz, Rosalie Auster, L.D. Levi

Instructors Ruth Richmond *(Social Work)*, Mildred Reynolds *(Social Work)*, R.B. Gerber

Clinical Instructors Harold Plotsky, W.H. Dobbs, W.A. Hamman, G.D. Legler, D.G. Lipman, S.A. Savitz, R.A. Blum, S.E. Samenow *(Psychology)*, W.F. Thompson, Martin Giller, D.I. Joseph, Judith Chused, Joan Sealy, Arlene Wolf *(Social Work)*, D.A. Berkowitz, Kenneth Kessler, E.R. Shapiro

Special Lecturers Julius Hoffman, J.T. English, Susan Fisher, J.B. Chassan *(Biostatistics)*, Dean Schuyler

*252 **Development of the Person** (1) Robinowitz and Staff

For 1st-year medical students. Basic presentation of normal personality development. Principles of psychological aspects of human growth and development. (Spring)

301 **Behavioral Sciences** (4) Doyle and Staff

A year course for 2nd-year medical students. Mental mechanisms, psychopathology, introduction to psychiatric syndromes, clinical interviewing, behavioral sciences in clinical medicine.

*302 **Clinical Clerkship** (5) Webster, Gerber, Cowell, and Staff

Supervised examination, diagnosis, treatment of outpatients and inpatients at University and St. Elizabeths hospitals; case conferences, seminars on psychiatric referral, "psychiatric" drugs, community resources. Psychiatry in general practice stressed. (Fall and spring)

350 **Basic Psychopathology and Psychodynamics** (2) Bever

A seminar format using reading materials and clinical demonstrations to explore the basis of mental illness. Limited to 25 2nd-year medical students. (Fall)

351 **The Role and Professional Identity of the Physician** (1) Webster, Robinowitz, Doyle

The class explores the personal and social factors of the role of the physician—the aspect of care, identity—through discussion conducted along group dynamic lines. Limited to 20 2nd-year medical students. (Fall and spring)

352 **Common Personality Configurations** (1) Lipsius

Selected commercial movies, viewed both during class and in student's free time, provide material illustrative of personality configurations and life styles to be analyzed in group discussions. Limited to 12 2nd-year medical students. (Fall)

353 **Basic Psychoanalytic Concepts** (1) Staff

Basic psychoanalytic concepts such as dreams, transference phenomena, the unconscious, and the various components of personality structure. Participation in discussions focusing on psychoanalytic issues and the relevance of such concepts to the practice of medicine in general. For first- or second-year medical students. Wash. Psychoanalytic Soc. Bldg. (Spring—8 sessions of 2 hours each)

* Required for medical students.

354 **Human Sexuality** (1) Sta

Normal sexual development; unusual sexual patterns; emphasis on sexu patterns in the context of the individual's growth experiences and cu rent life situation. For first- or second-year medical students. Wa Psychoanalytic Soc. Bldg. (Spring—8 sessions of 2 hours each)

382 **Clinical Psychiatry** (5) Cowd

Participation in clinical care of patients hospitalized for emotional and mental disturbances; individual and group therapy, somatic therapies, psychodrama. 4-week elective periods. St. Elizabeths Hosp.

383 **Psychiatric Day Care** (10) Advan

Participation in the evaluation of patients referred for day care and in the various activities and programs in the day care center. Research pertaining to the day care center in its role in the treatment of psychiatric patients. 8-week elective periods. Psychiatric Inst. of Wash.

384 **Geriatric Psychiatry** (5) Cowd

Participation in care and rehabilitative efforts with elderly inpatients with psychiatric and other incapacities. 4-week elective periods. St. Elizabeths Hosp.

385 **Schizophrenic Reactions** (5) Bullard

Observation and study of the administrative management and treatment of patients. Staff meetings, selected readings, individual instruction, complete case write-ups. 4-week elective periods. Chestnut Lodge, Rockville, Md

386 **Psychiatric Research** (5) Cowd

Participation in research programs involving clinical and experimental investigations of human behavior. 4-week elective periods. St. Elizabeths Hosp.

387 **Clinical Psychiatry** (5, 10, or 15) Goodma

Student admits patients, works with treatment team, organizes treatment plan, and treats patients in cooperation with and under supervision of other treatment team members. Emergency room and consultation work if desired. 4-, 8-, or 12-week elective periods. Univ. Hosp.

388 **Research: Chronic Patient** (10) Meyersbu

Research into social, anthropological, psychological factors influencing long-term care of patients with chronic diseases. 8-week elective periods Univ. Hosp.

389 **Day Hospitalization** (5 to 15) Crowle

Participation in the diagnostic and treatment programs of a separate and independent day hospital designed to prevent and replace full-time psychiatric hospitalization. Research in the area of partial hospitalization. One to three 4-week elective periods. Potomac Foundation for Mental Health

390 **Extramural Psychiatry Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact Dr. R.M. Coleman.

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* Dr. Bullard is Senior Consultant at Chestnut Lodge.

391 **Research: Constitutional Psychiatry and Psychiatric Aspects of Criminal Behavior** (5 or 10) S. Yochelson

(1) Somatotypy, genetics, encephalography, and sensory deprivation; emphasis on criminal behavior. (2) Detailed study of the social, anthropological factors producing criminal behavior; psychologic testing. 4- or 8-week elective periods. St. Elizabeths Hosp.

392 **Administrative Psychiatry** (5) Cowell

Practical problems of administering a large public psychiatric hospital. 4-week elective periods. St. Elizabeths Hosp.

393 **Independent Studies** (5) Webster

Clinical or research experience and instruction in aspects of psychiatry not included in clerkship; selections on basis of individual student interest. 4-week elective periods. Univ. Clinic

394 **Elective in Forensic Psychiatry** (5) Sager

Work in the rehabilitation of criminal offenders. 4-week elective periods. St. Elizabeths Hosp.

395 **Drug Problem** (5 or 10) Ratner

Participation in the evaluation and treatment of drug abusers in an outpatient setting. 4- or 8-week elective periods.

396 **Alcohol Inpatient Treatment** (5 or 10)

Participation in evaluation and treatment of patients hospitalized for chronic alcoholism. 4- or 8-week elective periods. V.A. Hosp.

397 **Family Medicine** (5) Vazuka

Working with medical outpatients who require some form of psychiatric intervention or evaluation of a brief nature. 4-week elective periods.

Radiology

Chairman: S.D. Rockoff
Associate Chairman: D.O. Davis
Directors of Divisions: S.D. Rockoff *(Diagnostic Radiology)*, R.C. Reba *(Nuclear Medicine, Co-director)*, V.M. Varma *(Nuclear Medicine, Co-director)*, Theodore Villafaña *(Radiation Physics)*, J.G. Maier *(Radiation Therapy)*

Professors S.D. Rockoff, J.G. Maier, D.O. Davis, W.J. McSweeney
Clinical Professors A.C. Wyman, M.M. Reeder, J.L. Doppman, W.O. Pischnotte, Q.E. Crews, Jr., R.C. Reba, J.J. Smith *(Nuclear Medicine)*, C.W. Ochs
Professorial Lecturer J.R. Andrews
Associate Professors Massoud Majd, V.M. Varma, Kattadiyil Poulose *(Research Nuclear Medicine)*
Associate Clinical Professors H.J. Kicherer, R.M. Caulk, C.F. Murphy, W.J. Nelson, G.J. Augustin, M.L. Nusynowitz
Assistant Professors S.J. Kurzbard, D.H. Knudson, Theodore Villafaña, May Lim Lesar, W.C. Eckelman, Ann Wolanske *(Allied Health)*, T.L. Lawson,

L.R. Kirkland, Jr., W.J. Bunnell, D.L. Breckbill, M.T. Freedman, E.I. Krufky, S.N. Lee, B.D. Pressman, J.R. Kirkwood

Assistant Clinical Professors S.R. Bersack, Marion Faris, A.S. Cigtay, V.K. Saini, M.A. Thomas, James Burwell, R.A. Butler, Sr., F.V. Schumacher, L.R. Milavickas, C.F. Tedford, H.W. Sanford, Jr., P.T. Kirchner, R.J. Lull, M.F. Moran, W.W. Olmsted, G.L. Smoron, Ralph Blumhardt, Eileen Brad... *(Radiobiology)*, W.C. Harvey, D.M. Milstein, D.L. Johnson *(Nuclear Med... cine Technology)*, M.C. Johnson

Assistant Professorial Lecturer R.C. Cavanagh

Instructor D.E.C. Hall

Clinical Instructors George Tievsky, S.M. Perl, Louis Wener, D.C. Hendri... R.J. Morton, Jr., J.A. Thomas, Ezell Westbrook

Special Lecturers A.L. Byrne, L.F. Pridgen, F.R. Pugh, B.E. Smith, R.M. Weisenberger, W.C. Cail, R.G. Conant, D.H. Manley, J.L. Naphier, K... Cole, G.E. Flook, W.E. Fulps, F.D. Screen, Jr., A.F. Whiting, J.C. He... genrother, W.F. Mellen, J.L. Firoved, M.J. Duea, P.E. Horsey, H.F. Mc... kiff, J.A. Waliszewski *(Nuclear Medicine)*, J.H. Coenen, B.A. Kendall

Courses numbered 40 through 190 are for students in the A.S. or B.S. degree programs in X-ray Techology, Nuclear Medicine, and Radiologic Science and Administration.

Staff

40 Clinical Training and Experience in X-ray Technology (6)

Instruction and close supervision in the use of radiologic techniques in ex... amining the digestive, urinary, female reproductive, central nervous, and circulatory systems; chest and abdomen radiography, orthopaedic radiog... raphy, ENT and neurologic radiography, portable radiographic examina... tions, pediatric radiography, nuclear medicine, radiation therapy.

Staff

41 Clinical Experience in Nuclear Medicine (9)

Practical study and supervised performance; emphasis on indications and contraindications, procedures and methods, physiological and procedura... factors which may result in a false study, radiation safety techniques, and administrative procedures.

Staff

50 Radiologic Anatomy I (4)

Human anatomy as applied to radiologic terminology. Structure and func... tion of the human skeleton and topographical anatomy, both normal and pathological. Prerequisite: Med 101 or equivalent.

Staff

51 Radiologic Anatomy II (4)

Human anatomy as applied to radiographic procedures. Structural and functional approach, application to radiography of the digestive, respira... tory, excretory, endocrine, reproductive, and nervous systems and the or... gans of special sense. Some discussion of medical and surgical diseases. Prerequisite: Rad 50.

Staff

55 Stationary and Rectilinear Imaging (3)

Related anatomy, physiology, and pathology of imaging procedures, and methodology of these and related procedures, including bone, brain, liver function, bone marrow, lung, liver-lung, transmission, cardiac blood pool, cisternography, spleen, parathyroid, pancreas, lung ventilation, carotid ventriculography; miscellaneous scans; brain and cardiac flow stu...

56 **Hematologic and Radionuclide Dilution Procedures** (3) Staff

Related anatomy, physiology, and pathology of hematologic and radionuclide dilution procedures; basic protocol for these procedures, including plasma volume and related plasma studies, red cell volume and related red cell studies, studies of iron metabolism, and the placental localization and scanning.

57 **Organ Concentration-Excretion Measurements** (3) Staff

Related anatomy, physiology, and pathology of organ concentration-excretion measurements; the procedure for those measurements, including thyroid uptake and its variations, thyroid scan, metastatic chest survey, renogram, renal scan, and renal flow study.

58 **Gastrointestinal Absorption Measurements** (1) Staff

Related anatomy, physiology, and pathology of gastrointestinal absorption measurements; the procedure for those measurements, including fat absorption studies (triolein and oleic acid) and the three stages of the vitamin B-12 absorption study (Schilling test).

59 **Competitive Binding Radioimmunoassay** (2) Staff

Basic concepts of radioassay; basic procedure for any competitive binding radioassay. Specific concepts and procedure for T3, T4, and serum B-12 determinations; factors affecting those determinations and the interpretation of their results.

60 **Radiographic Technique I** (4) Staff

Theoretical and practical study of X-ray machines, equipment, patient positioning, and radiographic qualities; history and development of X-ray, phototiming, X-ray tubes, and Bucky grids and their uses; anatomical landmarks, radiographic terminology, exposure factors, and variations; radiographic calibration (quality and quantity); marking of films and factors governing good film quality. Includes laboratory work.

61 **Radiographic Technique II** (4) Staff

Preparation of exposure charts and use of radiation protection devices; practical applications of technical uses of stationary and portable equipment under supervision; techniques for pediatric radiographs and methods of positioning and restriction; intra-oral radiography techniques. Photofluorographic chest units, departmental floor plans, basic office procedures. Includes laboratory work. Prerequisite: Rad 60.

62 **Darkroom Technology** (3) Staff

Processing of film after exposure; care and handling of conventional and automatic darkroom equipment; types of film, handling and storage; mixing and handling of chemicals and the action and quantity of these chemicals in the processing of film; effects of heat and cold on these chemicals, diagnosing of various improper developing techniques. Includes laboratory work.

65 **Basic Chemistry** (3) Staff

Introduction to basic chemistry, kinds of matter, atomic structure, the periodic table, chemical bonding, formulae and equations, solutions, acid-base reactions; introduction to organic chemistry and biochemistry; laboratory sessions.

Staff

66 **Radiopharmaceuticals** (3)

Uses of radionuclides in medicine, basic principles of a Mo-99/Tc-99m generator, radiopharmaceuticals and their action within the body, preparation of radiopharmaceuticals using generator-produced nuclides, quality control, accountability, procurement, clinical orientation.

Staff

70 **Electronics of Radiology I** (4)

Fundamental concepts of electricity such as battery types and construction, power and energy, simple circuits, series/parallel circuits, compound circuits. Description and function of various components of the circuits such as resistors and capacitors, magnetism and alternating current, magnetism and inductance, inductance and capacitance, and capacitance and transformers. Includes laboratory work.

Staff

71 **Electronics of Radiology II** (4)

Applications of electronic principles to X-ray equipment and components, transformers, meters, generators, rectifiers, basic electronics; electron tubes and solid state devices; equipment trouble-shooting and maintenance. Includes laboratory work. Prerequisite: Rad 70.

Staff

72 **Radiation Instrumentation** (5)

Theoretical and practical aspects of radiation detectors; types, components and operation of detectors; collimators; geometry; introduction to rectilinear scanning; introduction to stationary imaging; clinical orientation

Staff

75 **Fundamentals of Atomic and Nuclear Physics** (3)

Basic units, quantum theory, Bohr theory, atomic and nuclear structure, radioactivity and decay, alpha and beta particles, electromagnetic radiation, series decay, radioactive equilibrium, I.C.R.U.

Staff

80 **Mathematics of Radiology** (3)

Principles of mathematics as applicable to the physics of radiologic technology: use of the slide rule, including multiplication, division, powers, and roots; solution to linear equations in the unknown; cartesian coordinate plane; slope of straight line; determining linear equations from given conditions; graphic solution of two or more linear equations.

Staff

81 **Basic Mathematics** (3)

Review of basic high school mathematics, basic algebra, common and natural logarithms and their manipulation, linear and logarithmic graphing and manipulation of a log-log side rule.

Staff

82 **Applied Technical Mathematics** (3)

Mathematics as applicable to nuclear medicine; basic decay formula and its variations, calculation of doses of radionuclides, basic statistics terminology, frequency distributions, confidence limits, standard error, efficiency, distribution of counting time, statistics relating to rectilinear and stationary imaging.

Staff

90 **Ethics** (1)

Ethics of physician technician patient relationships. Responsibilities, both moral and legal, to the doctor patient and technologist relationship; the rapport expected of the technologist.

Staff

93 **Radiobiology and Radiation Dosimetry** (3)

Interaction of radiation with matter; radiation effects on molecular, cel-

lar, tissue, and organ levels; genetic and somatic effects of ionizing radiation; classical and M.I.R.D. methods of absorbed dose calculation.

94 **Radiological Safety** (3) **Staff**

Introduction to radiation safety; units of radiation exposure and dose; licensing; AEC regulations; accountability and records, receipt, storage, handling, transportation, and disposal of radioactive materials; monitoring; shielding; dose-distance relationships; personnel dosimetry; radiation illness; radiac instruments; radiation safety clothing; radioactive "spill" procedure.

95 **Radiation Safety** (3) **Staff**

Radiation tolerance, safety, and reporting photodosimetry; protective methods, control devices, shielding, half-life, detection, detection equipment, design and operation, thermoluminescence (its operation and uses), terminology and subject matter. Includes laboratory work.

96 **Radiation Biology** (3) **Staff**

Effects of radiation on basic cell structure through organ and whole body exposure; nature of radioactive particles and emissions, their effects on biological materials at the cellular and organismic level, particularly on the mammalian systems.

97 **Special Procedures** (3) **Staff**

Techniques of radiology employing contrast medias. Fluoroscopy, spot films, body section radiography, pelvimetry, placentography, location of foreign bodies of the eye, angiography, O.R. techniques, oral procedures, stereoscopy, pediatric angiographic procedures, etc. Prerequisite: Rad 61, 71.

98 **Therapy Procedures** (1) **Staff**

Introduction to radiation therapy and radium implants. Related anatomy, physiology, and pathology of phosphorous–32 and iodine–131 therapies and the technologist's responsibilities concerning them.

99 **Survey of Radiation Therapy and Nuclear Medicine** (3) Staff

Principles and practices of X-ray therapy and nuclear medicine techniques; purpose of radiation therapy and radioisotopes, their application, uses, types of equipment, and design. Prerequisite: Rad 51, 61, 71, 95, 96.

140 **Radiology Administration** (5) **Staff**

Instruction in the key areas of administration; human skills, technical skills, and conceptual awareness as they pertain to radiologic management at the department level. Traditional management concepts and models developed through modern texts and current journals which address the topics of organizational behavior, planning, controlling, etc. Discussion and exploration of the logistics of managing a radiology section.

141 **Clinical Practicum: Diagnostic Radiobiology** (6) **Rockoff**

Six-month practicum in which student performs administratively and clinically under the supervision of a physician.

142 **Clinical Practicum: Nuclear Medicine** (6) **Varma**

Six-month practicum in which student performs administratively and clinically under the supervision of a physician.

143 **Clinical Practicum: Radiation Therapy** (6)

Six-month practicum in which student performs administratively and clinically under the supervision of a physician.

170 **Radiation Physics and Safety** (5)

Concepts of matter and energy and electromagnetic radiation. Mechanisms in the production of X-rays. X-ray circuits, including half-wave and full-wave rectification and 3-phase generators. Interaction of radiation with matter, emphasizing the photoelectric, Compton, and pair-production effect. Radiation detection and dosimetry, Roentgen rad and rem units, radiation. Radiation safety as applied to diagnostic radiology, nuclear medicine, and radiotherapy, including effects of time, distance, and shielding. Maximum permissible dose and maximum permissible concentrations, internal dose problems.

171 **Radiological Electronics and Engineering** (3)

Introductory course designed to provide the student with an understanding of basic electronics as well as the operation, limitation, use and principles in the selection of instrumentation as well as the ability to perform simple trouble-shooting of radiological equipment. Transistors, power supplies, amplifiers, as well as major circuit components of radiation detection instruments, gamma camera and rectilinear scanners, radiotherapy ortho-voltage and linear accelerators, and diagnostic radiography equipment.

175 **Physics of Radiological Imaging** (3)

For students concentrating in diagnostic radiology. Image formation and transmission through radiological and related photo-optical devices, including system analysis techniques. Concepts of sensitivity, contrast, and modulation transfer functions. Description and analysis of photo receptors, including film grids and Bucky and intensifier screens. Radiographic development process. Fluoroscopy, cine radiography, and video techniques; image storage electronic radiography; and solid state imaging panels. Ultra sonography and thermography.

176 **Physics of Nuclear Medicine** (3)

For students concentrating in nuclear medicine. Concepts of radioactivity including beta decay, isomeric transitions, electron capture, internal transition, alpha decay, and the auger effect. Isotopic half-life secular and transient equilibrium. Artificial transmutations, nuclear reactions, counting statistics, and selection of instrumentation. Scintillation spectrometer techniques. Rectilinear scanners, gamma camera, and computer techniques in nuclear medicine.

177 **Dosimetry in Radiation Therapy** (3)

For students concentrating in radiotherapy. Concepts of depth dose, isodose curves, and tissue air ratios for different energies, TSD, and field size. Techniques of treatment planning for stationary, multiple, and moving portals for Co-60 and megavoltage linear accelerators. Concepts of wedge fields and compensation for multiple TSD surfaces and tissue inhomogenities. Dosimetry of linear sources. Quimby and Paterson plane dosimetry systems. Computer techniques in radiotherapy. Introduction to the dosimetry of electrons, neutrons, and the heavy particles.

190 **Radiobiology** (3)

Advanced course involving biological aspects of radiation.

physical, and genetic effects of radiation on cells and organisms. Prerequisite: Rad 93 or 96.

383 **Clinical Radiology** (5) Wyman and Staff

Radiologic differential diagnosis; emphasis on the role of diagnostic radiology in clinical problem-solving. Each student is assigned a patient population and correlates the radiologic examinations with the clinical manifestations of disease. The student prepares a brief clinical and radiological summary and participates in procedures, case conferences with staff members, and interaction with medical and surgical staff members. Daily lectures and staff conferences. Audio-visual self-instructing material. 4-week elective periods. Univ. Hosp.

384 **Diagnostic Radiology** (5) Burwell and Staff

Participation in general radiography, fluoroscopy, and special procedures; interpretation of radiologic procedures with staff; review and study of teaching film file. Attendance at medical, surgical, and pediatric staff conferences. 4-week elective periods. Fairfax Hosp.

385 **Nuclear Medicine** (5) Varma, Reba, and Staff

Introduction to the physics of radioisotopes, radiochemistry, radiation detection, and instrumentation. Theory and operation of the nuclear camera and scanner. Study of organ imaging techniques, by lectures, conferences, and participation in patient care. Introduction to radio-immune assay. Correlation between clinical problems and nuclear diagnosis. 4-week elective periods. Univ. Hosp. and Wash. Hosp. Center

386 **Radiation Therapy** (5) Maier and Staff

Introduction to radiotherapeutic techniques, physics of high-energy radiation and instrumentation. Radiation treatment and correlated management of malignant diseases; emphasis on decision-making in a clinical practice. 4-week elective periods. Univ. Hosp.

387 **Subspecialty Diagnostic Radiology** (5) Staff

Subspecialty offerings include pulmonary, gastrointestinal, urologic, obstetric and gynecologic, neurologic, and pediatric. 4-week elective periods. Univ. Hosp.

388 **Diagnostic Radiology** (5) Reeder and Staff

Participation in general radiography, fluoroscopy, and special procedures; interpretation of radiologic procedures with staff; review and study of teaching film file; conferences. 4-week elective periods. Walter Reed Gen. Hosp.

389 **Diagnostic Radiology** (5) Ochs and Staff

Same as Rad 388. 4-week elective periods. Nat'l. Naval Med. Center

390 **Extramural Radiology Elective** (arr.)

The Department arranges for students to spend elective periods at other institutions. Interested students should contact the Chairman of the Department.

391 **Diagnostic Radiology** (5) Schumacher and Staff

Same as Rad 388. 4-week elective periods. Wash. Hosp. Center

Surgery

Chairman: P.C. Adkins
Directors of Divisions: P.C. Adkins *(General Surgery, Thoracic and Cardiovascular Surgery)*, R.D. Shapiro *(Oral Surgery)*, J.G. Randolph *(Pediatric Surgery)*, L.W. Thompson *(Plastic Surgery)*

Professors C.T. Klopp *(Cancer)*, G.S. Letterman *(Plastic)*, J.G. Randolph, P.C. Adkins, Mitchell Mills, E.J. Rupnik, F.W. Plugge IV, J.E. McClenathan
Clinical Professors W.S. McCune, V.M. Iovine, G.A. Higgins, Jr., F.A. Gould, Francis Jackson, J.R. Thistlethwaite
Associate Professors H.C. Pierpont, T.C. Alford, P.E. Shorb, Jr., N.T. Tsangaris, W.L. Joseph, L.W. Thompson, W.D. Latham, W.J. Fouty, C.M. Herman, N.M. Rich, L.T. Bowles, Gerald Klebanoff
Associate Clinical Professors D.C. Wherry, Maxine Schurter, S.G. Mead *(Oral)*, N.P.D. Smyth, Leon Gerber, D.H. Glew, Jr., Don Wenger, R.W. Parsons, J.M. Keshishian, N.H. Isaacson, K.B. Absolon
Assistant Professors R.P. Altman, A.J. Slovin, E.J. Harper, Kathryn Anderson, C.B. Wright, R.W. Hobson II
Assistant Clinical Professors William Ferguson, J.J. Weinstein, F.B. Brandt, J.W. Canter, J.B. Harrell, L.R. Perna, S.M. Kirson, Fernando Sacasa *(Oral)*, R.D. Shapiro *(Oral)*, J.D. Alford, C.A. Silva, R.L. Flax, R.R. Cameron, W.C. Dempsey *(Plastic)*, H.F. Sears II, D.L. Sturtz, R.S. Filo, H.A. Steimel, J.M. Giordano, G.B. Helfrich, B.S. Teunis, R.C. Shaw, William Gee, L.E. Smith
Instructors S.M. Knoll, P.J. Corso
Clinical Instructors B.G. Brown, J.H. Sager, G.E. White, Sheldon Holen *(Periodontics)*, R.S. Siegel *(Oral)*, C.L. Magassy *(Plastic)*, W.H. Weintraub

*303 **Clinical Clerkship** (15)
12 weeks at Univ. Hosp. and Nat'l. Naval Med. Center

376 **Advanced Surgery** (5)
Participation in total patient care, including operative procedures under close supervision. 4-week elective periods. Andrews AFB Hosp., Nat'l. Naval Med. Center, Univ. Hosp., V.A. Hosp., Wash. Hosp. Center, Walter Reed Gen. Hosp.

378 **Intensive Care Unit** (5)
Introduction to the management of acutely ill surgical patients, including cases involving trauma; neurosurgery; and cardiovascular-thoracic, abdominal, and orthopaedic surgery. 4-week elective periods. Wash. Hosp. Center

379 **Transplantation Immunology** (5)
Clinical renal transplantation and preservation. Daily teaching rounds, literature conference, seminar presentation, weekly surgical-medical nephrology rounds. 4-week elective periods. Wash. Hosp. Center

384 **Thoracic-Cardiovascular Surgery** (5)
Study of the basic principles used in thoracic and cardiovascular surgery. 4-week elective periods. Univ. Hosp. and Clinic

* Required for medical students.

385 **Plastic Head and Neck Surgery** (5) Thompson

Participation in all activities, including preoperative and postoperative care, operating room procedures, clinical activities, conferences. Aesthetic surgery, head and neck cancer, maxillofacial trauma, hand surgery, congenital anomalies about the head and neck, and burns. 4-week elective periods. Univ. Hosp. and Clinic

386 **Pediatric Surgery** (5) Randolph

Participation in an active, closely supervised surgical service for infants and children, including congenital defects, cardiac surgery, trauma, and neoplasms. 4-week elective periods. Children's Hosp.

387 **Plastic Head and Neck Surgery** (5) Thompson, Parsons

Experience comparable to a surgical internship with integral participation in all activities of the service, including preoperative and postoperative care, operating room procedures, outpatient clinics, and conferences. Basic principles of wounds and their management, aesthetic and reconstructive surgery, and congenital anomalies. 4-week elective periods. Walter Reed Gen. Hosp.

389 **Surgical Preceptorship** (5) Iovine, McCune, Thistlethwaite, Isaacson

Participation in the care of general surgical patients as seen in private practice. 4-week elective periods.

390 **Extramural Surgery Elective** (arr.)

The Department arranges for students to spend one or more elective periods at other institutions. Students must have the approval of the Chairman of the Department.

392 **Peripheral Vascular Surgery** (5) Keshishian, Smyth, Slovin

Study and application of vascular surgery. 4-week elective periods. Wash. Hosp. Center

395 **Experimental Surgery** (5) Joseph

Participation in existing research projects and experimental operative procedures; assigned reading. 4-week elective periods. Surgical Research Lab., Warwick Bldg.

399 **Disaster Medicine** (1) Pierpont

Emergency medical care; teaching films and discussion concerning management of "on the scene" trauma and mass casualty situations. (Fall)

Urology

Chairman: H.C. Miller, Jr.

Professors L.R. Culbertson, H.C. Miller, Jr.
Clinical Professors E.E. Ferguson, W.D. Jarman
Associate Professor Mitchell Edson
Associate Clinical Professors F.T. Reuter, H.A. Goldberg, Anthony Borski, F.J. Frensilli, Chalon Rodriguez

Assistant Professor H.S. Semerdjian
Assistant Clinical Professors Gilbert Ottenberg, R.C. Rhame, John Keneally, George Dudas, H.J. Klapproth, R.E. Ware, W.L. Banfield III, I.S. Young, E.H. Soifer, I.J. Spence, D.M. Seitzman, B.T. Mittemeyer, Irwin Shuman, D.T. Schwartz, F.B. Hendricks, L.A. Jones
Clinical Instructors Hernando Salcedo, Barbara Black, T.A. MacLean, E.G. Abramson, J.B. Alperstein, R.A. Roth, B.I. Turner

Reuter

380 **Clinical Urology** (5)
Outpatient and diagnostic urology, cystoscopy and radiographic procedures. 4-week elective periods. Univ. Hosp.

Staff

381 **Clinical Urology** (5)
Observation of urologic conditions and procedures for diagnosis and treatment; radiologic and pathologic studies, endoscopy and surgery, collateral reading, weekly staff conference. 4-week elective periods. Univ. and V.A. Hosps., Nat'l. Naval Med. Center, Walter Reed Army Medical Center

Semerdjian

382 **Clinical Urology** (5)
Observation of urologic conditions and procedures for diagnosis and treatment, radiologic and pathologic studies, endoscopy and surgery, collateral reading, weekly staff conference. 4-week elective periods. V.A. Hosp.

Edson

383 **Clinical Urology** (5)
Outpatient and diagnostic urology; cystoscopic and operative urology. 4-week elective periods. Univ. Hosp. (2 weeks) and Nat'l. Naval Med. Center (2 weeks)

390 **Extramural Urology Elective** (arr.)
The Department arranges for students to spend elective periods in other institutions. Interested students should contact the Chairman of the Department.

Required or Recommended Courses in Allied Health Programs Offered in Other Divisions of the University

THE FOLLOWING COURSES are offered by Columbian College of Arts and Sciences or the School of Government and Business Administration, and are either required or recommended in specific undergraduate programs in the School of Medicine and Health Sciences. Students are reminded, however, that not all these courses are acceptable even as electives in certain Allied Health Programs. Students should consult with the program adviser in choosing electives for the particular program in which they are enrolled.

ACCOUNTING

1 **Introductory Accounting** (3)
Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communications of significant economic and financial data.

AMERICAN CIVILIZATION

71–72 **Introduction to American Civilization** (3–3)

Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance.

ANTHROPOLOGY

1–2 **Introductory Anthropology** (3–3)

Anth 1: survey of man's origin, physical evolution, and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior.

ART

31–32 **Survey of Western Art** (3–3)

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art.

71–72 **Introduction to the Arts in America** (3–3)

Painting, sculpture, and architecture of America, with selected references to crafts and popular arts. Art 71: from Colonial beginnings to the Republican Age. Art 72: from 19th century to the present.

BIOLOGICAL SCIENCES

11–12 **Introductory Biology for Science Majors** (4–4)

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Prerequisite to BiSc 12: BiSc 11. Material fee, $15 a semester.

104 **Comparative Vertebrate Anatomy** (4)

Lecture (2 hours), laboratory (4 hours). Evolution and comparative morphology of vertebrates, stressing recent forms. Material fee, $18.

111 **Introductory Microbiology** (4)

Lecture (2 hours), laboratory (4 hours). Survey of the major groups of microorganisms with emphasis on structure, physiology, ecology, phylogenetic relationships, and economic importance. Prerequisite: one year of chemistry. Material fee, $18.

127 **Genetics** (4)

Lecture (3 hours), laboratory (2 hours). Introductory course. Basic aspects of transmission of genetic traits with particular reference to the chemical basis of heredity and gene action. Material fee, $18.

148 **Histology** (4)

Lecture (2 hours), laboratory (4 hours). Introduction to microsopical anatomy of normal tissues and organs with emphasis on the interrelationship of structure and function. Material fee, $18.

154 **Vertebrate Zoology** (4)

Lecture and discussion (2 hours), laboratory and field (4 hours). Vertebrate natural history and systematics, emphasizing higher and transitional taxa. Prerequisite: BiSc 104. Material fee, $18.

163 **Human Physiology** (3)

Introduction to the function of organ systems of the human body.

164 **Human Physiology Laboratory** (1)

Study of basic physiology laboratory techniques; emphasis on the experimental study of homeostatic mechanisms in humans. Prerequisite or concurrent registration: BiSc 163. Material fee, $20.

165 **Vertebrate Physiology** (4)

Lecture (3 hours), laboratory (3 hours). Detailed study of selected organ systems, stressing chemical and physical bases. Prerequisite BiSc 163 and 164, or equivalent. Prerequisite or concurrent registration: Chem 151–52 or 50. Material fee, $20.

BUSINESS ADMINISTRATION

102 **Fundamentals of Management** (3)

Planning, organizing, directing, coordinating, and controlling activities of the administrative unit; evolution of management thinking.

105 **Personnel Management** (3)

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities.

CHEMISTRY

9 **General Chemistry** (4)

Offered only off campus. Introduction to chemistry, including basic laws of matter, atomic theory, chemical bonding, acids and bases, and solutions; structure, properties, and reactions of hydrocarbons; introduction to quantitative analysis.

11–12 **General Chemistry** (4–4)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $21 a semester.

22 **Introductory Quantitative Analysis** (4)

Lecture (2 hours), laboratory (6 hours). Theory and practice of quantitative analysis by classical methods; introduction instrumental analysis. Prerequisite: Chem 12. Laboratory fee, $21.

50 **Introduction to Organic Chemistry** (4)

Lecture (3 hours), laboratory (3 hours). A terminal course for students in related disciplines. This course does not fulfill the organic chemistry requirement for chemistry majors or premedical students. Prerequisite: Chem 12 or 16, *Intensive General and Analytical Chemistry*. Laboratory fee, $21.

ECONOMICS

1–2 Principles of Economics (3–3)

Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1 is prerequisite to Econ 2.

ENGLISH

9 English Composition: Language as Communication (3)
(Formerly Engl 1x)

Intensive course in English grammar and composition for students inadequately prepared for Engl 10. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 10. Engl 9 meets five hours a week and carries 3 semester hours of credit. Total fee, $295 (tuition of $270 plus additional fee of $25).

10 English Composition: Language as Communication (3)
(Formerly Engl 1)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure.

11 English Composition: Language and the Arts and Sciences (3)
(Formerly Engl 2)

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected readings on the nature of language and of the arts and sciences. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 11 cannot receive credit for Engl 12.

12 English Composition: Language in Literature (3)
(Formerly Engl 4)

Study and practice of expository and argumentative techniques through critical writing; emphasis on the rhetorical complexities of stylistics in the sentence and in diction, and on logical thought, by the study of literary genres and of the use of language in literature. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 12 cannot receive credit for Engl 11.

20 The Writing of Reports (3)
(Formerly Engl 11)

Offered only off campus. Theory and practice in the writing of technical reports. Prerequisite: Engl 9 or 10 and 11.

43–44 Classical Humanities (3–3)

Offered only off campus. Interdisciplinary study of the origins of Western thought. Reading and intensive class discussions of selections from the Bible and of five works each semester from the following authors: Homer, Hesiod, Aristophanes, Plato, Aristotle, Aeschylus, Euripides, Sophocles, Herodotus, Thucydides, Lucretius, Marcus Aurelius, Epictetus, Polybius, St. Augustine. Background lectures on the major intellectual, artistic, economic, and social movements. Prerequisite: Engl 9 or 10.

45–46 **Humanities in the Modern World** (3–3)

Offered only off campus. Interdisciplinary study of modern Western thought from the Renaissance to the 20th century. Reading and intensive class discussion of five works each semester from the following authors: Machiavelli, Pope, Voltaire, Rousseau, Goethe, Tolstoy, J.S. Mill, Zola, Nietzsche, Kierkegaard, Freud, Kafka, Koestler, T.S. Eliot. Background lectures on the major intellectual, artistic, economic, and social movements. Prerequisite: Engl 9 or 10.

51–52 **Introduction to English Literature** (3–3)

Representative works by major authors studied in their historical context, discussion of recurrent themes, and introduction to various types and forms of imaginative literature. Prerequisite: Engl 9 or 10.

71–72 **Introduction to American Literature** (3–3)

Historical Survey. Engl 71: from beginnings to the Civil War. Engl 72: from the Civil War to present. Prerequisite: Engl 9 or 10.

91–92 **Introduction to European Literature** (3–3)

Consideration of various types. Prerequisite: Engl 9 or 10

EXPERIMENTAL HUMANITIES

*26 **Environmental Issues** (3)

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy.

GEOGRAPHY AND REGIONAL SCIENCE

51 **Introduction to Geography** (3)

General survey of the systematic fields of human geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts.

52 **Introduction to Economic Geography** (3)

Examination of the basic principles which determine the location of economic activities on the surface of the earth.

HEALTH CARE ADMINISTRATION

203 **Health Care Organization and Management** (3)

Lecture and discussion (2 hours), laboratory (2 hours). History and current character of institutional health care. Organizational functions and structure of various kinds of health care facilities.

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* Offered jointly by the Division of Experimental Programs and the departments of Biological Sciences and Geography and Regional Science.

HISTORY

39–40 **European Civilization in Its World Context** (3–3)

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present.

71–72 **Introduction to American History** (3–3)

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from 1492 to 1861. Hist 72: from 1861 to present.

MATHEMATICS

3 **College Algebra** (3)

Equivalent to the standard two years of high school algebra with several additional topics. Prerequisite: one year each of high school algebra and high school geometry.

6 **Plane Trigonometry** (3)

Prerequisite: two years of high school algebra and one year of high school geometry, or Math 3 (or concurrent registration therefor).

9 **General Mathematics I** (3)

For students electing Math 9 and 10 as a terminal sequence. Logic, sets, number systems. Prerequisite: two years of high school mathematics.

10 **General Mathematics II** (3)

Mathematical systems, geometry, and introduction to statistics and probability. Prerequisite: Math 9.

30 **Precalculus** (3)

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students must take a placement examination in algebra and trigonometry.

31 **Calculus of One Variable** (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent.*

51 **Mathematics for the Social and Management Sciences I** (3)

Notion of function, graph of function; sequences; differential and integral calculus of functions of one variable; exponential and logarithmic functions. New students must take a placement examination in algebra prior to registration.

52 **Mathematics for the Social and Management Sciences II** (3)

Functions of several variables; partial derivatives, maxima and minima, Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51.

* Math 30 may be waived as a prerequisite by examination on scheduled dates.

MUSIC

3 **Introduction to Musical Understanding** (3)
Introductory history of musical styles, related to listening; elements and materials of music.

4 **Survey of Music Literature** (3)
Introductory study of musical forms, structures, and textures; aural analysis of selected literature.

PHILOSOPHY

50 **Introduction to Philosophy** (3)
Readings from major philosophers and study of philosophic positions from Plato to the present.

POLITICAL SCIENCE

4 **Introduction to Political Science** (3)
Study of political behavior, including the role of politics in today's world, the sources of elite and mass political behavior, and the influence and nature of political institutions. Students who receive credit for PSc 4 cannot receive credit for PSc 5.

5 **Introduction to Political Science** (3)
Introduction to the study of comparative political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies. Students who receive credit for PSc 5 cannot receive credit for PSc 4.

6 **Introduction to Political Science** (3)
Introduction to the study of the structure, powers, and processes of the American political system.

PSYCHOLOGY

1 **General Psychology** (3)
Fundamental principles underlying human behavior.

8 **Psychology of Motivation and Personality** (3)
Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized. Prerequisite: Psyc 1 or equivalent.

22 **Introduction to Educational Psychology** (3)
The contributions of psychology to education; emphasis on learning. Prerequisite: Psyc 1 or equivalent.

144 **Personnel and Industrial Psychology** (3)
Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation, and productivity. Prerequisite: 6 semester hours in psychology.

151 **Social Psychology** (3)

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war. Prerequisite: 6 semester hours in psychology.

RELIGION

9 **The Hebrew Scriptures** (3)
(Formerly The Old Testament)

Historical and literary study of the Hebrew Scriptures with consideration of development of religious ideas, institutions, and outstanding personalities.

10 **The New Testament** (3)

Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles.

59–60 **History of Religions** (3–3)

Origins, evolution, and contemporary status in historical context. Rel 59: primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam).

SOCIOLOGY

1 **Introductory Sociology** (3)

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior.

2 **Uses of Sociology** (3)
(Formerly American Social Problems)

Introduction to the various methods by which sociologists have approached the investigation of social phenomena. Prerequisite: Soc 1.

124 **Medical Sociology** (3)

Social factors and processes related to the etiology and treatment of physical and mental illnesss; medical occupations and professions, medical organizations, problems of delivery of health care services. Prerequisite: Soc 1.

129 **Race and Minority Groups** (3)

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice. Prerequisite: Soc 1.

SPEECH AND DRAMA

111 **Business and Professional Speaking** (3)

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs,

and services; interviews; conferences; speech in training and supervisor activities. Primarily for nonmajors.

121 **Group Discussion and Conference Leadership** (3)

Process of thinking and problem-solving in committees and small group methods of leading discussions and conferences. Prerequisite: SpHD *Communicative Speaking and Listening*, or permission of instructor.

STATISTICS

*51 **Introduction to Business and Economic Statistics** (3)

Lecture (3 hours), laboratory (1 hour). Frequency distribution, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18.

*91 **Principals of Statistical Methods** (3)

Lecture (3 hours), laboratory (1 hour). Variables and attributes, averages and dispersion, frequency distributions and their characteristics, regression and correlation, statistical decision processes. Laboratory fee $18.

101–2 **Basic Principles of Statistical Methods** (3–3)

Offered only off campus. Variables and attributes, averages and dispersion, elementary principles of sampling, introduction to the making of statistical decisions. Prerequisite to Stat 102: Stat 101.

* Stat 51; 53, *Introduction to Statistics in Social Sciences;* and 91 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree.

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES

Faculty and Staff of Instruction*

EMERTI

Theodore Judson Abernethy, *Professor Emeritus of Clinical Medicine*
B.S. 1925, Denison University; M.D. 1929, Johns Hopkins University

Errett Cyril Albritton, *Professor Emeritus of Physiology*
B.A. 1916, University of Missouri—Columbia; M.D. 1921, Johns Hopkins University

Harry Ford Anderson, *Professor Emeritus of Dermatology and Syphilology*
M.D. 1924, University of Cincinnati

Brian Brewer Blades, *Professor Emeritus of Surgery*
B.A. 1928, University of Kansas; M.D. 1932, Washington University

Walter Andrew Bloedorn, *Professor Emeritus of Medicine*
M.D. 1909, Creighton University; B.A. 1915, M.A. 1916, Sc.D. 1948, George Washington University

Thomas McPherson Brown, *Professor Emeritus of Medicine*
B.A. 1929, Swarthmore College; M.D. 1933, Johns Hopkins University

Dexter Means Bullard, *Professor Emeritus of Clinical Psychiatry*
Ph.B. 1920, Yale University; M.D. 1923, University of Pennsylvania

Paul Calabrisi, *Professor Emeritus of Anatomy, in Residence*
B.A. 1931, Catholic University of America; M.A. 1940, George Washington University; Ph.D. (Cantab.) 1955, University of Cambridge

Frank Duncan Costenbader, *Professor Emeritus of Clinical Ophthalmology*
B.S. 1925, Hampden-Sydney College; M.D. 1929, University of Virginia

Jeremiah Keith Cromer, *Professor Emeritus of Clinical Obstetrics and Gynecology*
M.D. 1929, B.A. 1931, George Washington University

Henry Lauran Darner, *Professor Emeritus of Clinical Obstetrics and Gynecology*
B.A. 1916, Western Maryland College; M.D 1920, Johns Hopkins University

Paul Frederick Dickens, *Professor Emeritus of Clinical Medicine*
M.D. 1908, University of Nashville

* The Faculty and Staff of Instruction listed here and at the head of each department is for the academic year 1973–74. Faculty and staff members who hold appointments in two departments have the department of primary responsibility listed first.

Samuel Mayer Dodek, *Professor Emeritus of Clinical Obstetrics and Gynecology*
B.A. 1923, George Washington University; M.D. 1927, Thomas Jefferson University; M.A. 1[illegible] Case Western Reserve University

William Rankin Duryee, *Research Professor Emeritus of Pathology (Experimental)*
B.A. 1927, Ph.D. 1933, Yale University

James Albert Dusbabek, *Professor Emeritus of Clinical Obstetrics and Gynecology*
M.D. 1934, George Washington University

Clayton Bernard Ethridge, *Professor Emeritus of Medicine*
M.D. 1933, University of Virginia

Clarence Kendall Fraser, *Professor Emeritus of Clinical Obstetrics and Gynecology*
Ph.B. 1931, College of the Holy Cross; M.D. 1935, Tufts University

James Quincy Gant, Jr., *Professor Emeritus of Clinical Dermatology*
B.A. 1930, M.S. 1931, Ohio State University; M.D. 1935, Medical College of Virginia, of Virginia Commonwealth University

Alec Horwitz, *Professor Emeritus of Clinical Surgery*
B.A. 1920, M.D. 1923, George Washington University; M.S. in Surg. 1927, University of Minnesota

Hayden Kirby-Smith, *Professor Emeritus of Clinical Dermatology*
B.S. 1927, University of the South; M.D. 1937, George Washington University

Chester Elwood Leese, *Professor Emeritus of Physiology*
B.A. 1922, M.A. 1925, Ph.D. 1930, University of Iowa

Edward Lewis, *Professor Emeritus of Clinical Pediatrics*
M.D. 1918, George Washington University

Preston Alexander McLendon, *Professor Emeritus of Pediatrics*
B.S. 1913, Wake Forest University; M.D. 1915, Columbia University

Daniel Bruce Moffett, *Professor Emeritus of Otolaryngology*
B.A. 1910, University of Richmond; M.D. 1915, University of Maryland

Margaret Mary Nicholson, *Professor Emeritus of Clinical Pediatrics*
B.A. 1922, M.D. 1925, George Washington University

George Nordlinger, *Professor Emeritus of Clinical Obstetrics and Gynecology*
B.A. 1918, M.D. 1922, George Washington University

Lois Irene Platt, *Associate Professor Emeritus of Pathology, in Residence*
B.A. 1931, Goucher College; M.D. 1946, University of Maryland

Herbert Pollack, *Professor Emeritus of Clinical Medicine (Biochemistry)*
B.A. 1925, Washington and Lee University; M.D. 1929, Cornell University; Ph.D. 1933, University of Minnesota

Frederick A. Reuter, *Professor Emeritus of Urology*
M.D. 1916, George Washington University

Benjamin Rones, *Professor Emeritus of Clinical Ophthalmology*
B.A. 1922, M.D. 1926, Johns Hopkins University

Ernest Alfred Watson Sheppard, *Professor Emeritus of Clinical Ophthalmology*
M.D., C.M. 1926, Queens University, Canada

Donald Harrison Stubbs, *Professor Emeritus of Clinical Anesthesiology*
B.A. 1929, M.A. 1931, M.D. 1932, George Washington University

Ira Rockwood Telford, *Professor Emeritus of Anatomy*
B.A. 1931, M.A. 1933, University of Utah; Ph.D. 1942, George Washington University

Thomas Carlton Thompson, *Professor Emeritus of Clinical Urology*
B.S. in Med., M.D. 1920, George Washington University

Janet Graeme Travell, *Professor Emeritus of Clinical Medicine*
B.A. 1922, Wellesley College; M.D. 1926, Cornell University

John Augustine Washington, *Professor Emeritus of Clinical Child Health and Development*
B.A. 1924, Virginia Military Institute; B.S. 1926, University of Virginia; M.D. 1930, Johns Hopkins University

James Winston Watts, *Professor Emeritus of Neurological Surgery*
B.S. 1924, Virginia Military Institute; M.D. 1928, University of Virginia

Richard Wallace Wilkinson, *Professor Emeritus of Clinical Ophthalmology*
B.A. 1925, M.D. 1928, George Washington University; M.S. in Med. 1932, University of Pennsylvania

ACTIVE

Abe Samuel Abraham, *Associate Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1938, Westminster College, Pennsylvania; M.D. 1950, George Washington University

Kristof Abraham, *Assistant Clinical Professor of Neurology*
M.D. 1952, Budapest University

Edward Gerald Abramson, *Clinical Instructor in Urology*
B.A. 1962, University of Pennsylvania; M.D. 1967, University of Virginia

Fred Paul Abramson, *Assistant Research Professor of Pathology and of Pharmacology*
B.A. 1962, Case Western Reserve University; Ph.D. 1965, Ohio State University

Karel Bedrich Absolon, *Associate Clinical Professor of Surgery*
M.B. 1948, Masaryck University, Czechoslovakia; M.D. 1952, Yale University; M.S., Ph.D. 1963, University of Minnesota

R. Marshall Ackerman, *Clinical Instructor in Orthopaedic Surgery*
B.S. 1958, M.D. 1962, University of Pittsburgh

George Leslie Adams, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences and of Medicine*
B.S. 1963, M.D. 1967, Tulane University of Louisiana

John Pletch Adams, *Professor of Orthopaedic Surgery and of Child Health and Development*
B.S. 1943, University of Missouri—Columbia; M.D. 1945, Washington University

Edward Adelson, *Associate Clinical Professor of Medicine*
B.S. 1943, M.D. 1947, Tufts University

Paul Charles Adkins, *Lewis Saltz Professor of Surgery*
B.A. 1944, M.D. 1948, Johns Hopkins University

Mohan Teckchand Advani, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1955, Punjab University, India; M.B., B.S. 1960, Osmani University, India; D.P.M. 1964, Mysore University, India

Lewis Francis Affronti, *Professor of Microbiology*
B.A. 1950, M.A. 1951, State University of New York at Buffalo; Ph.D. 1958, Duke University

Cosimo Ajmone-Marsan, *Assistant Clinical Professor of Neurology*
M.D. 1942, University of Torino

Khawla Razzak Al-Abbousi, *Instructor in Child Health and Development*
M.B., Ch.B. 1966, University of Baghdad

Julio Estuardo Alarcon, *Clinical Instructor in Obstetrics and Gynecology*
M.D. 1966, University of Trujillo, Peru

Chalom Albert, *Assistant Clinical Professor of Anesthesiology*
B.A. 1949, M.D. 1953, American University of Beirut

Dan George Albert, *Assistant Clinical Professor of Ophthalmology and of Child Health and Development*
B.S. 1938, Ohio State University; M.D. 1950, Syracuse University

Ernest Narinder Albert, *Associate Professor of Anatomy*
B.S. 1959, High Point College; M.S. 1963, University of Pittsburgh; Ph.D. 1965, Georgetown University

Solomon Naphtali Albert, *Associate Clinical Professor of Anesthesiology*
B.A. 1936, M.D. 1940, American University of Beirut

Yousef Al-Doory, *Assistant Professor of Epidemiology and Environmental Health*
B.S. 1945, University of Baghdad; M.A. 1951, University of Texas at Austin; Ph.D. 1954, Louisiana State University and Agricultural and Mechanical College

Charles Edward Alexander, Jr., *Associate Professorial Lecturer in Epidemiology and Environmental Health*
B.A. 1951, Yale University; M.D. 1955, University of Pennsylvania; M.P.H. 1959, D.P.H. 1964, Johns Hopkins University

James David Alford, *Assistant Clinical Professor of Surgery*
B.A. 1959, M.D. 1966, University of North Carolina at Chapel Hill

Theodore Crandall Alford, *Associate Professor of Surgery*
B.A. 1944, Haverford College; M.D. 1947, Johns Hopkins University

Frank Duane Allan, *Professor of Anatomy*
B.S. 1947, M.S. 1949, University of Utah; Ph.D. 1954, Louisiana State University and Agricultural and Mechanical College

James Curwood Aller, *Associate Research Professor of Clinical Engineering*
B.S. 1942, United States Naval Academy; M.A. 1949, M.E.S. 1954, Harvard University; D.Sc. 1968, George Washington University

Melvin Gustavus Alper, *Clinical Professor of Ophthalmology*
B.A. 1943, M.D. 1945, University of Virginia

Joel Barry Alperstein, *Clinical Instructor in Urology*
B.S. 1961, M.D. 1967, University of Maryland

Hubert Joseph Alpert, *Clinical Instructor in Medicine*
M.D. 1962, University of Illinois at the Medical Center

Louis Katz Alpert, *Professor of Medicine*
B.S. 1928, M.D. 1932, Yale University

Seymour Alpert, *Professor of Anesthesiology; Vice President of the University for Development*
B.A. 1939, Columbia University; M.D. 1943, State University of New York Downstate Medical Center

Roy Peter Altman, *Assistant Professor of Surgery and of Child Health and Development*
B.A. 1955, Colgate University; M.S. 1958, University of Rochester; M.D. 1961, New York Medical College

Alice Hackney Altstatt, *Assistant Professor of Anesthesiology*
B.A. 1949, Bryn Mawr College; M.A. 1952, M.D. 1956, Vanderbilt University

Sirus Amiri, *Clinical Instructor in Child Health and Development*
M.D. 1956, University of Tehran

Harvey Hirsch Ammerman, *Clinical Professor of Neurological Surgery*
B.S. 1939, M.D. 1943, George Washington University

Arthur James Anderson, *Clinical Instructor in Medicine*
M.D. 1961, George Washington University

James Edward Anderson, *Clinical Instructor in Obstetrics and Gynecology*
B.A. 1955, Union College, Nebraska; M.D. 1965, Loma Linda University

Kathryn Duncan Anderson, *Assistant Professor of Surgery and of Child Health and Development*
B.A. 1961, M.A. 1964, University of Cambridge; M.D. 1964, Harvard University

W. French Anderson, *Professorial Lecturer in Biochemistry (Genetics)*
B.A. 1958, M.D. 1963, Harvard University; M.A. 1960, University of Cambridge

William Staton Anderson, *Clinical Professor of Child Health and Development*
B.A. 1927, Duke University; M.D. 1931, Johns Hopkins University

J. Robert Andrews, *Professorial Lecturer in Radiology*
Ph.B. 1928, Brown University; M.D. 1932, Case Western Reserve University; D.Sc. 1946, University of Pennsylvania

John Lawrence Angel, *Professorial Lecturer in Anatomy and Anthropology*
B.A. 1936, Ph.D. 1942, Harvard University

Tatiana Antonovych, *Professorial Lecturer in Pathology*
M.D. 1941, University of Vienna

Leonard Philip Appel, *Clinical Instructor in Medicine*
B.A. 1953, M.D. 1957, New York University

Ronald Alan Apter, *Assistant Clinical Professor of Medicine*
M.D. 1958, George Washington University

Minoru Araki, *Assistant Research Professor of Ophthalmology*
M.D. 1957, M.S.D. 1962, Tokyo Medical and Dental University

Irwin Ardam, *Assistant Clinical Professor of Medicine*
B.A. 1948, New York University; M.D. 1954, New York Medical College

Bryan Arling, *Instructor in Medicine*
B.A. 1965, University of Minnesota; M.D. 1969, Harvard University

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B.A. 1947, M.D. 1952, American University of Beirut; M.S. 1957, University of Iowa

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B.S. 1969, B.S. in Med. 1971, University of North Dakota; M.D. 1973, George Washington University

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B.A. 1959, M.A. 1964, M.D. 1970, George Washington University

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B.A. 1969, Duke University; M.D. 1973, University of North Carolina at Chapel Hill

Tryfon Spiliotis, *Assistant in Medicine*
M.D. 1960, University of Athens

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B.S. 1963, American University; Ph.D. 1969, University of Maryland; M.D. 1973, Howard University

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M.B., B.S. 1964, M.D. 1968, University of Madras

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Van Thanh Vu, *Teaching Fellow in Pharmacology*
B.A. 1973, Case Western Reserve University

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B.A. 1967, Millikin University; M.D. 1972, George Washington University

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B.A. 1969, Northwestern University; M.D. 1973, New Jersey College of Medicine and Dentistry

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B.S. 1966, Trinity College, Connecticut; M.D. 1973, Hahnemann Medical College

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B.A. 1965, University of Pennsylvania; M.D. 1969, George Washington University

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B.A. 1967, Lafayette College; M.S., M.D. 1971, Georgetown University

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B.S. 1969, University of Notre Dame; M.D. 1973, University of Cincinnati

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B.A. 1969, Tulane University of Louisiana; M.D. 1973, Wake Forest University

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B.A. 1963, Illinois College

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M.B., B.S. 1965, University College Hospital, England

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B.S. 1969, Drexel University; M.D. 1973, Thomas Jefferson University

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B.S. 1966, M.D. 1970, Chulalongkorn University, Thailand

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B.A. 1963, Georgetown University; M.D. 1967, University of Michigan

Melvin Wolf, *Assistant in Ophthalmology*
B.A. 1963, Temple University; M.D. 1967, Thomas Jefferson University

Nathan Woodruff, *Assistant in Pathology*
B.S. 1968, University of Maryland; M.D. 1972, Howard University

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B.S. 1969, University of Maryland; M.D. 1973, George Washington University

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B.S. in Phar. 1963, Albany College of Pharmacy; M.D. 1967, George Washington University

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B.A. 1967, University of Pennsylvania; M.D. 1972, Temple University

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FIRST YEAR

Allen, Donald W.
B.A. 1972, University of Utah — Mont.

Auger, Michael J.
B.A. 1973, University of Pennsylvania — N.J.

Autieri, Michael F.
B.A. 1973, Colgate University — Conn.

Anderson, Robert E.
B.S. 1971, University of Washington — Wash.

Annaster, William L.
B.A. 1972, University of California, Berkeley — Calif.

Artus, Frederick L.
B.A. 1973, Johns Hopkins University — Md.

Barone, Charles J.
Attended Wayne State University — Mich.

Bayley, Robert S.
B.S. 1972, Gonzaga University — Wash.

Bayer, Edward A.
B.S. 1969, University of Illinois at Urbana-Champaign — Calif.

Benner, Charles M.
B.S. 1973, American University — Ind.

Bennett, Howard J.
B.S. 1972, University of Maryland — N.Y.

Berkowitz, Ellis R.
B.A. 1973, Washington University — N.J.

Bernstein, Robert M.
B.S. 1973, State University of New York at Albany — N.Y.

Bertolli, Susan J.
B.A. 1970, University of California, Berkeley — Calif.

Birnbaum, Stuart E.
M.A. 1972, Stanford University

Blatt, David E.
B.S. 1972, Emory University — Ga.

Boas, Mark C.
B.A. 1973, Harvard University — Ind.

Boe, John F., Jr.
B.S. 1973, University of Rhode Island — R.I.

Borgeng, Neil H.
B.A. 1973, University of North Carolina at Chapel Hill — N.C.

Bosta, John A.
B.A. 1973, Emory University — N.J.

Brenner, Myron D.
B.A. 1973, Duke University — Md.
B.A. 1963, Columbia University — Pa.
B.Arch. 1968, University of Pennsylvania

Brickhouse, William D.
B.S. 1973, Clark College — Va.

Brinton, Milton H.
Attended Brigham Young University — Calif.

Brown, David L.
B.S. 1970, U.S. Military Academy — Fla.

Cantamout, Steven E.
B.S. 1973, University of Santa Clara — Calif.

Casas, Luis A.
B.A. 1973, Johns Hopkins University — Spain

Chung, Kenton L.
B.A. 1973, University of California, Berkeley — Calif.

Clark, Bernard A.
B.S. 1973, Dickinson College — Md.

Clark, Gordon H., Jr.
B.A. 1970, Yale University — Conn.
M.Div. 1973, Pacific School of Religion

Cohen, Marc D.
B.A. 1973, Dartmouth College — Ill.

Cole, Martha T.
B.A. 1967, Vassar College — N.J.

Crisp, Ronald J.
B.S. 1967, Wheeling College — Md.
M.S. 1972, Georgetown University

Daniels, Toni D.
B.S. 1973, Fairleigh Dickinson University, Rutherford — N.J.

Davis, Kathleen K.
B.A. 1968, Wellesley College — Md.

DeOrio, James K.
B.S. 1970, U.S. Air Force Academy — Mich.

Dodge, John H.
B.A. 1973, Harvard University — Md.

Dolgin, Frederick C.
B.A. 1973, Yale University — Mass.

Domaleski, Robert P.
B.S. 1973, St. Peter's College — N.J.

Dondero, Lynn R.
B.A. 1972, B.A. 1973, University of California, Berkeley — Va.

Dudley, Martha D.
B.A. 1973, Brown University — D.C.

Dynof, Francis R. N.J.
B.A. 1973, Rutgers University, New Brunswick

Eisenfeld, Larry S. Va.
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Emsellem, Helene A. Md.
Attended University of Maryland

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B.A. 1972, University of Pennsylvania

FitzHarris, Joseph B. N.Y.
B.S. 1973, U.S. Military Academy

Frisby, Shayla A. Va.
B.A. 1966, Trinity College, D.C.

Fuchs, Daniel G. Md.
B.A. 1973, Dartmouth College

Galante, Ardele M. N.Y.
B.S. 1973, Tufts University

Garfinkle, Terry J. N.Y.
B.A. 1973, University of Pennsylvania

Glaza, Eve E. Utah
B.F.A. 1970, University of Utah

Glikin, Sanford E. Va.
B.S. 1973, George Washington University

Gorham, Jay R. Wash.
B.S. 1973, Washington State University

Gorman, Joel R. D.C.
B.A. 1973, Wesleyan Universtiy

Gorovoy, Mark S. N.J.
B.A. 1973, Duke University

Greene, Robert D. N.Y.
B.A. 1972, George Washington University

Hales, Robert E. Ill.
B.S. 1970, U.S. Military Academy

Hanowell, Leland H. Calif.
B.S. 1973, University of California, Davis

Harhay, Joseph S. N.Y.
B.A. 1972, Syracuse University

Harrison, Johnny Ruth Calif.
B.S. 1973, George Washington University

Hawkins, Matthew T., Jr. Pa.
B.S. 1971, University of Pennsylvania

Hochman, Bruce N. Calif.
B.A. 1972, University of California, Berkeley

Holl, Thomas M. Ohio
B.S. 1973, George Washington University

Hom, Kenrick E. N.Y.
B.S. 1973, Tufts University

Hopkins, William P. Wis.
B.S. 1973, University of Minnesota

Hopper, Anne R. N.J.
B.A. 1973, University of Vermont

Horn, Martin S. N.H.
B.A. 1973, University of New Hampshire

Hotez, Lawrence S. Conn.
B.S. 1973, Trinity College, Conn.

Hughes, Dawn E. Pa.
Attended Bucknell University

Imershein, Ruth E. N.Y.
B.A. 1972, Washington University

Isaacson, Dale H. Md.
Attended Washington University

Jacobson, Jeff N.J.
B.A. 1973, University of Rochester

Johnson, Jo Ann Mass.
B.S. 1973, Stonehill College

Kampmeier, Patricia A. Ill.
B.A. 1973, Northwestern University

Kanter, Mitchel A. Md.
B.S. 1973, Duke University

Kehne, Susan M.
B.S. 1973, Mount Holyoke College

Keller, Marc S.
B.A. 1973, Hamilton College

Kolzak, Nancy E.
B.S. 1973, Smith College

Kravitz, Jack A.
Attended George Washington University

Kubik, Carolyn J.
B.A. 1973, University of Kansas

Kung, George Y.
B.S. in E.E., 1973, University of Washington

Kushner, Mark J.
B.A. 1973, Johns Hopkins University

Lagin, Sheri J.
B.A. 1973, George Washington University

Laigon, Eugene E., Jr.
B.S. 1973, Muhlenberg College

Lamensdorf, Michael
B.A. 1973, Oberlin College

Lederer, Helen A.
B.S. 1972, George Washington University

Levine, Laurence E.
B.A. 1972, New York University

Lewis, Norman
B.A. 1973, Vassar College

Libby, Louis S.
B.S. 1972, Tufts University

Liebermann, Joan V.
B.A. 1973, University of Wisconsin—Madison

Lustig, Ilana D.
B.S. 1973, Fairleigh Dickinson University, Teaneck

Maunder, Richard J.
B.A. 1972, University of California, Berkeley

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Model, Lawrence M.
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B.A. 1968, Vassar College
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Parker, Paul M.
B.S. 1973, Union College, N.Y.

Paul, Michael L.
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Paviuk, Charles H.
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Puro, David M.
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Rabkin, Anne E.
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Rubinstein, Michael N. Md.
B.A. 1973, Wesleyan University

Rusin, Grant M. N.J.
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B.A. 1961, Syracuse University

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Schneider, Marta A. D.C.
B.A. 1973, Trinity College, D.C.

Schulman, Jeffrey M. Va.
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Shumaker, Douglas R. Pa.
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Skaben, Deborah S. Ind.
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B.A. 1973, Dartmouth College

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Sokoloff, Daniel O. Fla.
B.A. 1972, Tulane University of Louisiana

Stansfield, Stephen J. Wash.
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Stine, Walter S. Ohio
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B.S. 1973, Brigham Young University

Thompson, Joanne Calif.
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B.S. 1973, Stanford University

Uretsky, Stephen H. N.J.
B.S. 1973, University of Maryland

Van Nice, Robert B. Wash.
B.S. 1970, Montana State University

Vickers, Curtis W. N.Y.
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Weitz, Susan R. N.Y.
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Widlitz, Michael D. N.Y.
B.G.S. 1973, University of Michigan

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B.A. 1966, M.A. 1968, University of California, Berkeley

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Winston, Jonathan A. N.Y.
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B.A. 1972, Villanova University

Brauner, Robert E. Pa.
B.S. 1971, Cornell University

Braverman, Joseph S. N.Y.
B.S. 1970, City University of New York, City College

Brenner, Alan S. Wash.
B.A. 1972, University of Washington

Briggs, Richard R. Utah
B.S. 1972, University of Wyoming

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B.S. in E.E., B.S. in M.E. 1958, Washington University
M.S. in M.E. 1962, Stanford University

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B.S. 1972, Bucknell University

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B.S. 1972, Union College, N.Y.
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B.A. 1963, Dartmouth College
Ph.D. 1968, University of Alberta
Dedick, Paul E. N.J.
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DePoix, Christopher Va.
B.A. 1972, Princeton University
Doner, Kathy S. Mich.
B.S. 1970, Stetson University
M.P.H. 1972, University of Michigan
Dorman, Sanford A. Conn.
B.A. 1972, Hobart College
Doyle, John E. Md.
B.S. 1972, U.S. Air Force Academy
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B.S. 1972, University of Washington
Earle, Martin F. Ohio
B.S. 1972, Carnegie-Mellon University
Elliott, Susan T. Md.
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M.S. 1972, George Washington University
Emhoff, Timothy A. Conn.
B.S. 1972, U.S. Air Force Academy
Enos, William F. Va.
B.A. 1972, Dartmouth College
Feldman, Isadore A. Md.
B.S. 1972, University of Maryland
Finkelstein, Jerome L. N.Y.
B.A. 1972, New York University
Fisher, Daniel B. D.C.
B.A. 1965, Princeton University
Ph.D. 1969, University of Wisconsin—Madison
Fochios, Steven E. N.Y.
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Francis, Thomas E. Ala.
Attended Emory University
Galbavy, Edward J. N.Y.
B.S. 1971, Georgetown University
Gandy, Charles L., III N.M.
B.S. 1970, U.S. Military Academy
Gannon, Carmen Md.
B.S. in Nursing 1957, Loyola College
M.S. 1959, University of Maryland
Gold, Marjorie B. D.C.
B.A. 1969, Cornell College
Goldstein, Gary E. N.Y.
B.S. 1972, George Washington University
Goldstein, Stafford S. N.Y.
B.A. 1972, University of Pennsylvania
Gooch, Brent R. Idaho
B.S. 1972, Utah State University
Gossom, John B. Md.
B.A. 1972, Occidental College
Greenwood, Lee H. Utah
B.A. 1972, University of Utah
Gurian, Ellen L. N.Y.
B.A. 1972, New York University
Hamilton, Kathleen M. Pa.
Attended George Washington University
Hartman, Albert R. Utah
Attended Utah State University
Healy, Michael J. Utah
B.S. 1972, Weber State College
Heller, Julianna W. D.C.
B.S. in Med.Tech. 1965, George Washington University
Hermann, Christopher P. Conn.
B.S. 1972, Villanova University
Hidalgo, Hector J.
Attended George Washington University
Hillmann, Scott
B.A. 1972, University of Delaware
Hirschberg, Joel M.
B.A. 1972, George Washington University
Holt, Rickie B.
B.S. 1972, Utah State University
Horn Babette J.
B.A. 1972, Barnard College
Horwitz, Stephen J.
B.A. 1972, George Washington University
Hubenette, Antoinette T.
B.A. 1968, University of California Berkeley
B.S. 1970, George Washington University
Huey, Richard G.
B.S. 1971, University of California, Berkeley
Hyldahl, Douglas R.
B.S. 1972, University of Utah
Johnson, Margery R.
B.A. 1972, Smith College
Jones, Noble S.
B.A. 1970, Swarthmore College
Kabnick, Lowell S.
B.A. 1972, George Washington University
Katske, Floyd A.
B.A. 1972, Rutgers University New Brunswick
Kay, Douglass A.
B.S. in M.E. 1969, Purdue University
Keahey, Thomas M.
B.A. 1972, George Washington University
Keenan, Andrew M.
B.S. 1972, Tulane University of Louisiana
Kendall, Martha R.
B.A. 1969, Wellesley College
Kinziger, Mark S.
B.A. 1972, Kalamazoo College
Kiviat, Jeffrey H.
B.S. 1972, Cornell University
Klein, Michael I.
B.A. 1972, Washington and Jefferson College
Knutson, Eric L.
Attended Bucknell University
Kohrn, Bruce Z.
B.A. 1972, Western Maryland College
Kope, Walter R.
B.S. 1972, University of Hartford
Kornreich, Michael
B.A. 1971, George Washington University
Koroma, Banio P.
B.S. 1972, Mount Union College
Kovacs, Karen F.
B.S. 1972, Bucknell University
Kozar, Mark D.
B.S. 1971, M.S. 1972, University of California, Irvine
Krembs, Gerhard A., II
B.A. 1972, Eisenhower College
Leo, Philip A.
B.S. 1972, Bucknell University
Leonard, Andrea
B.S. 1970, University of Michigan
Levin, Wayne S.
Attended Clark University
Locko, Roberta C.
B.A. 1972, Manhattanville College
Longmore, James L.
B.S. 1972, University of Maryland

Madden, Michael R. N.Y.
B.A. 1971, College of the Holy Cross
Madsen, Bard R. Calif.
B.S. 1972, Brigham Young University
Maher, Stephen C. Wash.
B.S. 1970, University of Notre Dame
Mason, Randall P. Md.
B.A. 1972, Northwestern University
McCowin, Marcia J. Calif.
B.A. 1972, University of California, Berkeley
McLoone, James R. Ariz.
B.A. 1972, University of Arizona
Merliss, Andrew D. N.J.
B.A. 1972, Colgate University
Metz, Marilyn B. R.I.
B.A. 1969, Wheaton College, Mass.
M.S. 1972, Harvard University
Morris, Ray D., II Ohio
B.S. 1972, University of Akron
Murphy, James P., Jr. D.C.
B.A. 1972, Yale University
Nathanson, Barry R. N.Y.
B.S. 1972, State University of New York at Albany
Nemiro, Jay S. Pa.
B.A. 1972, Temple University
Nevius, Patricia D. D.C.
B.A. 1971, Hiram College
Niechniedowicz, Lynne M. N.Y.
B.S. 1972, St. John's University, N.Y.
Oliver, Gregory C. N.J.
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Orme, Geoffrey A. Utah
B.A. 1972, University of Utah
Ostroff, Robert B. Va.
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Oyewole, Morakinyo A. Nigeria
B.S. 1971, Federal City College
Pagnanelli, David A. Pa.
B.A. 1972, Temple University
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B.A. 1970, University of California, Berkeley
Paul, Ronald A. Md.
B.A. 1971, Temple University
Pearl, Russell K. Conn.
B.A. 1972, University of Connecticut
Perlman, Mark L. Md.
B.A. 1972, Duke University
Pollack, Louis D. N.Y.
B.S. 1971, George Washington University
Quan, Marvin M. Calif.
B.S. 1972, University of California, Davis
Quigley, James M. Md.
B.A. 1971, Wesleyan University
Quinn, Michael J. N.Y.
B.A. 1972, Dartmouth College
Rabkin, Lawrence E. Md.
B.A. 1972, Yale University
Roberts, Jesse A., Jr. Mo.
B.A. 1972, Washington University
Romansky, Stephen H. Md.
B.A. 1966, Brown University
M.A. in Govt. 1972, George Washington University
Rosen, Leonard A. N.Y.
B.A. 1971, George Washington University
Roth, Henry J. N.Y.
B.A. 1972, Miami University
Sablove, Robert S. N.Y.
B.S. 1971, University of New York at Albany
Salter, David M. Calif.
B.S. 1972, California Polytechnic State University
Schneider, Donald R. N.Y.
B.S. 1972, State University of New York at Buffalo
Schulman, Martin F. N.J.
B.A. 1964, New York University
Ph.D. 1968, Rutgers University, New Brunswick
Schuman, Paula C. N.Y.
B.A. 1972, New York University
Seal, Craig M. Utah
B.S. 1972, University of Utah
Seligson, Gene R. N.Y.
B.S. 1972, George Washington University
Shapiro, Steven L. Md.
B.S. 1972, Yale University
Sher, Robert J. Md.
B.A. 1972, Hiram College
Shupe, David D. Utah
B.A. 1972, University of Utah
Simonsen, Steven A. N.Y.
B.S. 1972, St. Lawrence University
Smalley, David E. Calif.
B.S. 1972, Brigham Young University
Smith, Richard G. Calif.
Attended Brigham Young University
Solof, Robert H., Jr. N.Y.
B.S. 1970, Purdue University
Spiegel, Jane S. Fla.
B.A. 1971, Duke University
Spinella, Joseph A. Conn.
B.A. 1971, University of Pennsylvania
Strawberry, Carl W. D.C.
B.S. 1972, St. Vincent College
Talboys, Paul A. Md.
B.A. 1972, University of Texas at Austin
Taylor, Charis R. Calif.
B.S. 1972, Stanford University
Vangrov, Mark S. Ohio
B.A. 1970, Miami University
Vargyas, Joyce M. N.J.
B.A. 1970, George Washington University
Weaver, Albert J. Va.
B.S. 1970, George Washington University
White, Gregory E. Mass.
B.A. 1972, St. Anselm's College
Willis, Dean N. Maine
B.A. 1972, Assumption College
Wishner, Kathleen L. Calif.
B.A. 1963, California State University, San Francisco
Ph.D. 1968, University of California, San Francisco
Wolfsheimer, Frank B., Jr. D.C.
B.S. 1971, Purdue University
Wong, Raymond P. N.Y.
B.S. 1972, Fordham University
Woods, Anne M. Pa.
B.A. 1971, Catholic University of America
Yaffe, Bruce H. Md.
B.A. 1972, George Washington University
Yago, Kate B. Md.
B.S. 1972, George Washington University
Zimmerman, Brian L. Md.
B.S. 1972, University of Maryland
Zolkind, Neil A. N.Y.
B.S. 1972, George Washington University

THIRD YEAR

Amster, Steven M. — N.J.
B.A. 1968, Middlebury College

Andrews, Margaret E. — Md.
B.A. 1971, Mount Holyoke College

Besch, George A. — Conn.
B.S. 1971, Trinity College, Conn.

Boman, Keith G. — Nev.
B.A. 1971, University of California, Santa Barbara

Bosiego, John W. — Pa.
B.S. 1970, U.S. Military Academy

Brenton, Charles J., Jr. — N.J.
B.S. 1971, University of Maryland

Cain, Michael E. — N.J.
B.A. 1971, Gettysburg College

Caldwell, John W. — Calif.
B.S. in Engr.Sc. 1971, Northwestern University

Call, Richard A., II — Utah
B.A. 1971, Brigham Young University

Caplin, Stuart R. — N.Y.
B.S. 1971, University of Miami

Carmen, John C. — Wyo.
B.S. 1970, University of Wyoming

Chin-Lee, William B. — D.C.
B.S. 1971, George Washington University

Choisser, William V. — Md.
B.S. 1971, Pennsylvania State University

Clark, David E. — N.J.
B.A. 1971, Dartmouth College

Clarke, Leon E. — Liberia
B.A. 1971, Washington and Jefferson College

Cohen, Alan A. — Md.
B.A. 1972, George Washington University

Cricco, Carl F. — N.J.
B.S. 1971, Fairfield University

Cumming, John G. — N.J.
B.A. 1971, Ohio Wesleyan University

Curry, Edward B. — D.C.
B.S. 1963, Morehouse College

Davis, James E. — N.J.
B.A. 1971, Lafayette College

Daynes, Randall P. — Utah
B.A. 1971, University of Utah

DiFiore, Kent C. — Nev.
B.S. 1970, George Washington University

Dimond, Marlin L. — Utah
B.A. 1972, University of Utah

Donegan, Martha F. — N.C.
B.A. 1971, University of North Carolina at Chapel Hill

Dorff, Robert J. — Ohio
B.S. 1971, Georgetown University

Doyle, Edward J., Jr. — Va.
B.S. in Engr. 1970, Duke University

Elliott, Daniel C. — Calif.
B.A. 1971, Stanford University

Ellyn, Nicholas — N.J.
B.S. 1971, University of Maryland

Farber, Stuart P. — N.Y.
B.A. 1971, George Washington University

Filipescu, Nicolae — Va.
Ph.D. 1957, University of Industrial Chemistry, Polytechnic Institute, Rumania
Ph.D. 1964, George Washington University

Fitzmaurice, Arthur G. — Mass.
B.A. 1971, St. Anselm's College

Footer, Robert D. — Md.
B.S. 1971, Ohio State University

Fortuna, Lawrence J.
B.S. 1969, M.S. 1971, South Dakota State University
B.S. in Med 1973, University of South Dakota

Frank, Charles G.
B.S. 1970, Washington and Lee University

Freer, Everett C., Jr.
B.A. 1969, California Western University

Gale, John H.
B.A. 1970, Duke University

Gillespie, Dorothy L.
B.S. 1971, North Carolina Agricultural and Technical State University

Giuli, Michael F.
B.S. 1971, University of Alabama

Gladsden, Robert E.
B.A. 1971, Franklin and Marshall College

Goldberg, Linn
B.S. 1970, University of Oregon

Goldman, William D.
B.A. 1972, George Washington University

Gordon, Harriet L.
B.S. 1964, Howard University

Greenberg, Jay B.
B.A. 1971, George Washington University

Greenfield, Robert M.
B.A. 1968, George Washington University
M.S. 1971, Georgetown University

Hall, Courtland J.
B.S. in Phar. 1966, University of Missouri-Kansas City

Hansing, Ronald L.
B.S. 1967, Southern Illinois University

Hardy, James R.
B.A. 1962, B.S. 1964, University of Washington

Hart, Michael M.
B.S. 1964, Ph.D. 1970, George Washington University
M.S. 1966, University of Michigan

Hauck, Kenneth W.
B.S. 1968, U.S. Military Academy

Heron, William H.
B.A. 1971, Johns Hopkins University

Hieb, Michael J.
Attended Creighton University

Hom, Frederick G.
B.A. 1971, University of California, Berkeley

Howisey, Robert L.
B.S. 1971, University of Washington

Hughes, Susan M.
B.A. 1971, Manhattanville College

Jacobs, Marc H.
B.A. 1971, Washington University

Johnson, Glenn D.
B.A. 1970, Princeton University

Jorris, Marlene L.
B.A. 1962, Adelphi University
B.S. in Ch.E. 1969, M.S. in Ch.E. 1964, Massachusetts Institute of Technology

Kaiser, Cathryn I.
B.A. 1970, Elmira College

Katzen, Harvey I.
B.S. 1972, Georgetown University

Kellett, Mirle A., Jr.
B.A. 1969, Dartmouth College

Kessler, Fred B.
B.S. 1971, George Washington University

Kimbleton, Dennis P. N.J.
B.A. 1971, Rutgers University, New Brunswick
Kofoed, Kenneth R. Utah
B.S. 1971, University of Utah
Lancaster, Vere L. Utah
B.S. 1971, University of Utah
Lardinois, Claude K. S.D.
B.A. 1971, B.S. in Med. 1973, University of South Dakota
Lautin, Andrew L. N.Y.
B.A. 1970, Columbia University
Learn, Martin P. D.C.
B.A. 1971, University of Miami
Leichner, John P. Md.
B.S. 1965, St. Joseph's College, Pa.
M.S. 1967, Ph.D. 1970, Catholic University of America
Lieberman, Jeffrey A. Ohio
B.A. 1970, Miami University
London, Raymond G. Conn.
B.A. 1971, Clark University
Lough, Frederick C., Jr. N.Y.
B.S. 1970, U.S. Military Academy
Lyonga, Doris E. West Cameroun
B.S. 1969, Barat College of the Sacred Heart
MacDougall, Monica K. Va.
B.A. 1970, Case Western Reserve University
Maddi, Rosemarie N.Y.
B.A. 1971, Mount Holyoke College
Maliniak, Keith K. Pa.
B.A. 1971, Franklin and Marshall College
Mangasarian, Robert A. Md.
B.A. 1971, Boston University
Mann, Jason N.Y.
B.A. 1971, University of Pennsylvania
Marble, Richard D. Wash.
B.A. 1970, Claremont Men's College
Marcus, Steven J. Calif.
B.A. 1970, University of Wisconsin—Madison
Matsuoka, Lois Y. Hawaii
B.A. 1971, Mills College
McCullars, George M. Fla.
B.S. in Agri. 1968, University of Florida
M.S. 1971, George Washington University
Mehl, Raymond E. Kans.
B.S. 1965, Ph.D. 1971, University of Kansas
Metheny, Jeffry A. Pa.
B.S. 1970, Geneva College
Miles, John P., Jr. Ohio
B.A. 1964, Brown University
Mills, Carl N.Y.
B.A. 1971, Syracuse University
Mohn, Edward S., Jr. Texas
B.A. 1968, George Washington University
M.S. 1972, Georgetown University
Montgomery, Thomas R. Md.
B.S. 1971, Bucknell University
Neswelt, Clark M. Ind.
B.S. 1971, University of Wisconsin—Madison
Ney, Alan B. D.C.
B.S. 1971, St. Lawrence University
Ngumi, Paul G. Kenya
B.S. 1967, Central State University
M.S. 1971, University of Dayton
Nochniedowicz, Frank E. N.Y.
B.S. 1970, St. John's University, N.Y.
Nonstrand, Lucille J. N.Y.
B.A. 1971, Vassar College

O'Connor, Sharon E. N.Y.
B.A. 1971, Mount Holyoke College
O'Keefe, Ruth A. Wis.
Attended Marquette University
Okehi, Chukuemeka O. Nigeria
B.A. 1971, University of Colorado
Okum, Neil H. Mich.
D.D.S. 1970, University of Detroit
Osborne, Robert W., Jr. Wash.
B.A. 1971, University of Washington
Page, Michael J. Mont.
B.A. 1971, University of Colorado
Paglen, Patrick G. N.Y.
B.S. 1971, U.S. Air Force Academy
Palmer, Richard N. N.M.
B.S. 1971, New Mexico State University
Patterson, Eugene B. Calif.
B.A. 1969, Stanford University
Peters, Jacob K. Calif.
B.A. 1971, Pacific College
Phair, Robert F. N.J.
B.S. 1967, Newark College of Engineering
J.D. 1971, Georgetown Univeristy
Piepgrass, Sterling R. Utah
B.S. 1971, University of Utah
Reed, Allan P. N.Y.
B.A. 1972, George Washington University
Rich, Deborah J. N.Y.
B.A. 1970, University of Pennsylvania
Richards, Peter C. Calif.
B.A. 1971, University of California, Los Angeles
Rosenblatt, Arnold J. Md.
B.S. 1969, George Washington University
Ross, Michael A. N.Y.
B.S. 1971, Dickinson College
Rothman, Barry S. Md.
B.A. 1971, George Washington University
Rucker, Richard D. Ariz.
B.A. 1969, M.S. 1970, University of Arizona
Saehoo, Smith Thailand
B.A. 1966, Columbia Union College
M.S. 1970, George Washington University
Safran, Julian E. Md.
B.A. 1972, George Washington University
Schaefer, Gregory N. S.D.
B.A. 1971, University of South Dakota
Schauer, Peter K. Conn
B.S. 1971, University of Hartford
Schlameus, Jeffrey F. Mont.
B.S. 1971, University of North Dakota
Schutt, David C. N.Y.
B.S. 1971, U.S. Air Force Academy
Scott, Thomas W. Va.
B.S. 1969, George Washington University
Scovern, Henry N. N.J.
B.A. 1971, University of Pennsylvania
Seigel, Leonard J. N.J.
B.A. 1971, University of Rochester
Shibata, Carl S. Calif.
B.A. 1971, University of California, Los Angeles
Shubert, Dennis L. Maine
B.S. 1969, M.S. 1970, Tufts University
Sims, Edward G. Ill.
B.A. 1971, Northwestern University
Smith, Wallace D. Utah
B.A. 1971, Weber State College
Sorensen, James M. Calif.
B.S. 1971, University of California, Berkeley

Spier, Ronald B. N.Y.
B.A. 1970, New York University
Sveda, Sally A. Conn.
B.A. 1965, Smith College
M.S. 1968, Yale University
Swartz, Joel D. Ohio
B.S. 1971, Ohio State University
Sweet, Nancy D. N.J.
B.S. 1969, Chestnut Hill College
Tall, Roger H. Idaho
Attended Brigham Young University
Thompson, Fitzroy N. N.Y.
B.S. 1967, City University of New York, City College
Tornow, John J. S.D.
B.S. 1971, Creighton University
B.S. in Med. 1973, University of South Dakota
Trigg, Michael E.
B.A. 1971, Trinity College, Conn.
Trumbull, Donald
B.S. 1971, McGill University
Van Atta, Glenn B.
B.A. 1965, Ohio Northern University
Warden, Steven S.
B.S. 1971, Muskingum College
Weiner, Jay H.
B.A. 1971, George Washington University
Wiesner, Don R.
B.S. 1970, Oregon State University
Wile, Charles H.
B.A. 1971, Duke University
Young, George
B.S. 1971, Columbia University
Zinar, Lawrence C.
B.E., B.S. 1968, State University of New York at Stony Brook

FOURTH YEAR

Abrahms, Eliot R. Conn.
B.A. 1966, University of Pennsylvania
Altman, Richard S., Jr. Pa.
B.A. 1970, Franklin and Marshall College
Amick, Roger W.Va.
B.B.A. 1970, Marshall University
Bacon, John R. Md.
B.S. 1970, George Washington University
Ball, John T. Calif.
B.A. 1970, University of Virginia
Balsley, Ellen J. Va.
B.A. 1967, Indiana University at Bloomington
Bane, Susan H. Md.
B.A. 1968, George Washington University
Barratt, Paul F. N.J.
B.A. 1969, New York University
M.M.S. 1972, Rutgers University, New Brunswick
Barton, John S. Wash.
B.A. 1969, Lewis and Clark College
B.S. in Med. 1972, University of South Dakota
Basen, Walter B. Md.
B.S. 1970, University of Maryland
Baska, John K. Calif.
B.A. 1970, George Washington University
Berlin, Gregory S. Wash.
B.A. 1970, University of Washington
Billing, Paul M. Calif.
B.A. 1970, Whitman College
Blumberg, Andrew M. N.J.
B.S. 1970, University of Wisconsin—Madison
Boyd, James C. Md.
Attended University of Maryland
Burgess, Scott E. N.Y.
B.A. 1970, George Washington University
Burtoff, Bruce D. D.C.
B.A. 1970, University of Pennsylvania
Callahan, Michael E. Utah
B.S. 1970, Brigham Young University
Camp, Gregory V. Ore.
B.S. 1968, University of Oregon
Clark, Thomas H. Va.
B.S. 1970, George Washington University
Cohn, Howard C. Pa.
B.S. 1968, University of Pittsburgh
Cornelius, Douglas H.
Attended University of Colorado
Cresswell, George F.
Attended Washington and Lee University
Crotty, Nancy K.
B.S. 1968, University of Maryland
Danylevich, Alec
B.A. 1969, Harvard University
B.Med.S. 1972, Dartmouth College
Donahue, George M.
B.S. 1964, Fairfield University
Donovan, Joseph W.
B.A. 1969, Manhattan College
Downing, Terence P.
B.A. 1970, University of Washington
Eisner, Martin E.
B.A. 1970, University of Wisconsin—Madison
Engleberg, Niels C.
B.S. 1970, George Washington University
Falkowski, Walter S.
B.S. 1967, St. Peter's College
M.A. 1969, Princeton University
Faul, Gregory B.
B.S. in Med. 1972, University of North Dakota
Ferguson, Edwin E., Jr.
B.S. 1966, University of Rochester
Finn, Peter V.
B.A. 1970, University of Massachusetts—Amherst
Furlow, Terrance G.
Attended George Washington University
Gardner, Melinda M.
B.A. 1965, Duke University
Gloster, Robert C.
B.S. 1970, Georgetown University
Gluck, Rita K.
B.A. 1968, New York University
Goldblatt, Robert S.
B.A. 1970, George Washington University
Goldman, Steven L.
B.S. 1970, George Washington University
Gorin, Michael E.
B.A. 1970, Northwestern University
Greene, Michael A.
B.S. in E.E. 1964, State University of New York at Buffalo

Greenfield, Paul S. N.J.
B.A. 1970, University of Pennsylvania
Hair, Joyce E. Pa.
B.A. 1970, Hood College
Hall, Frank A. Ala.
B.A. 1970, Emory University
Hardy, William R. Calif.
B.A. 1970, University of California, Riverside
Hartz, Leo M. Pa.
B.A. 1969, Pennsylvania State University
Henricksen, Gary L. Wash.
B.S. in Phar. 1970, University of Washington
Heron, Howard C., II Md.
B.A. 1970, George Washington University
Hirsch, Florie N.Y.
B.A. 1970, Barnard College
Hobbs, Charles L., III Del.
B.A. 1969, Yale University
Howard, Douglas R. Mass.
B.S. 1970, Brown University
Hurley, Michael S. Va.
B.S. 1962, College of the Holy Cross
D.D.S. 1966, Georgetown University
Insler, Harvey P. Fla.
B.S. 1969, Renaselaer Polytechnic Institute
Isaacson, Paul J. Md.
B.A. 1970, Johns Hopkins University
Jenkins, Roger C., Jr. Calif.
B.S. 1970, University of Washington
Kalu, Uduma O. Nigeria
B.S. 1967, Iowa State University of Science and Technology
Kaplan, Jack O. N.Y.
M.S. 1969, Howard University
Kast, Frederic H., III N.J.
B.S. 1970, George Washington University
Kelly, Gregory B. Conn.
B.A. 1970, Colgate University
Kennedy, James J. Md.
B.S. 1970, University of Maryland
Kerr, Vicky E. S.C.
B.A. 1969, Duke University
Kestenbaum, David J. N.Y.
B.A. 1970, Boston University
Krakovitz, Robert W. Pa.
B.A. 1970, Hofstra University
Kutcher, Leslie M. N.Y.
B.A. 1969, Pennsylvania State University
Laney, Steven R. Wash.
B.S. 1970, City University of New York, Brooklyn College
Lau, Mark M. Calif.
B.S. 1970, University of Washington
Little, Albert G. Md.
B.A. 1970, University of California, Berkeley
London, David B. Nev.
B.S. 1967, D.D.S. 1971, University of Maryland
Ludlow, Paul C. Calif.
B.A. 1970, George Washington University
Manart, Frank D. Calif.
B.S. 1970, Brigham Young University
Mangiaracina, Thomas A. N.Y.
B.A. 1969, University of Southern California
Marks, William A. N.Y.
B.A. 1970, New York University
McCormick, Joseph P. N.Y.
B.A. 1969, St. Lawrence University
B.A. 1969, Alfred University

McIntyre, Robert C. Wash.
B.S. 1969, Washington State University
Miller, Robert E. N.Y.
B.A. 1970, Hofstra University
Murray, Ives P. N.Y.
B.A. 1969, University of Colorado
Neslen, George Q. Calif.
B.A. 1967, Stanford University
Newman, Robert E. Md.
B.A. 1970, Lafayette College
Noguchi, Philip D. Calif.
B.A. 1970, University of California, Berkeley
Pagano, Samuel W. N.J.
B.A. 1970, Johns Hopkins University
Passeri, Ronald L. N.J.
B.A. 1970, Rutgers University, New Brunswick
Payes, William C. N.Y.
B.S. 1970, Syracuse University
Poole, Robert W. Md.
B.S. 1970, Dickinson College
Principi, Kathy L. Ohio
B.A. 1970, Rutgers University, New Brunswick
Rabinowitz, Asher D. D.C.
B.A. 1970, Yeshiva University
Radice, Peter A Md.
B.A. 1970, Yale University
Remick, Ronald A. Ohio
B.A. 1970, Johns Hopkins University
Richardson, Bruce W. Wash.
B.A. 1969, University of Washington
B.S. in Med. 1972, University of South Dakota
Ross, Gary S. N.Y.
B.A. 1970, Colgate University
Ruby, Jo-Anne B D.C.
B.S. 1967, M.S. 1970, George Washington University
Sacks, Maury E. N.Y.
B.A. 1970, Lehigh University
Sarafan, Peter M. N.Y.
B.A. 1970, Amherst College
Sarsfield, Gregory R. Md.
B.S. 1968, George Washington University
Scalettar, Robert E. N.Y.
B.A. 1969, University of Wisconsin—Madison
Sexton, Robert L. Wash.
B.S. in Basic Medical Science 1970, Gonzaga University
Silva, John S. R.I.
B.S. 1968, Providence College
Smith, Alan W. Md.
B.S. 1970, Carson-Newman College
Smith, Kenneth R. Fla.
Attended Florida Atlantic University
Starke, Peter R. N.Y.
B.A. 1970, Trinity College, Conn.
Sternburg, Jon K. Md
B.A. 1970, Bowdoin College
Stevens, Kathleen Colo.
B.A. 1970, University of Colorado
B.S. in Med. 1972, University of South Dakota
Taylor, Paul R. Utah
B.A. 1970, Weber State College
Thomas, Katherine L. Ark.
Attended University of Arkansas
Thompson, John M Tenn.
B.S. 1970, Florida Southern University

Thomson, John W. Utah
B.S. 1970, Brigham Young University
Tievsky, Andrew L. Md.
B.A. 1970, University of Rochester
Trenbeath, James M. N.D.
B.A. 1970, Macalester College
B.S. in Med. 1972, University of North Dakota
Valk, Thomas H. Del.
B.S. 1969, Harvey Mudd College
Van Brakle, John D. Pa.
B.S. 1970, Muhlenberg College
Van Osdel, Lewis A., III
B.A. 1968, University of Washington
Vorachek, Mary A.
B.A. 1962, University of Michigan
Whitfield, Peter W.
B.A. 1969, University of Rhode Island
Wisotsky, Philip
B.A. 1970, Boston University
Yimoyines, Dean J.
B.A. 1969, Syracuse University
Zagorski, Joseph B.
B.A. 1969, University of Pennsylvania

Summaries of Registration, M.D. Program

NUMBER OF REGISTRANTS

Class entering 1973	150	Class entering 1971	141
Class entering 1972	148	Class entering 1970	116

GEOGRAPHICAL DISTRIBUTION OF MEDICAL STUDENTS

Alabama	2	New Mexico	2
Arizona	3	New York	104
Arkansas	1	North Carolina	4
California	45	North Dakota	4
Colorado	3	Ohio	13
Connecticut	24	Oregon	2
Delaware	2	Pennsylvania	25
District of Columbia	27	Rhode Island	4
Florida	8	South Carolina	1
Georgia	1	South Dakota	4
Hawaii	1	Tennessee	1
Idaho	4	Texas	21
Illinois	6	Utah	1
Indiana	5	Vermont	27
Kansas	3	Virginia	20
Maine	4	Washington	1
Maryland	85	West Virginia	3
Massachusetts	14	Wisconsin	1
Michigan	6	Wyoming	1
Minnesota	1	Hong Kong	1
Missouri	2	Kenya	1
Montana	3	Liberia	3
Nevada	4	Nigeria	1
New Hampshire	1	Sierra Leone	1
New Jersey	52	Spain	

INSTITUTIONS IN WHICH MEDICAL STUDENTS EARNED DEGREES

Adelphi University	1	Amherst College	1
Akron, University of	1	Arizona, University of	1
Alabama, University of	1	Assumption College	1
Alberta, University of	1	Barat College of the Sacred Heart	2
Alfred University	1	Barnard College	1
American University	1	Bennett College, N.C.	1

Boston University	3
Bowdoin College	1
Bradley University	1
Bridgeport, University of	1
Brigham Young University	8
Brown University	4
Bryn Mawr College	1
Bucknell University	6
California Polytechnic State University	1
California State University, San Francisco	1
California, University of:	
Berkeley	15
Davis	2
Irvine	1
Los Angeles	3
Riverside	1
San Francisco	1
Santa Barbara	1
California Western University	1
Carnegie-Mellon University	1
Carson-Newman College	1
Case Western Reserve University	1
Catholic University of America	3
Central State University	1
Chestnut Hill College	1
Claremont Men's College	1
Clark College	1
Clark University	1
Colgate University	5
Colorado, University of	4
Columbia Union College	1
Columbia University	3
Connecticut, University of	1
Cornell College	1
Cornell University	5
Creighton University	1
Dartmouth College	9
Dayton, University of	1
Delaware, University of	1
Detroit, University of	1
Dickinson College	3
Duke University	11
Eisenhower College	1
Elmira College	1
Emory University	3
Fairfield University	2
Fairleigh Dickinson University, Rutherford	1
Fairleigh Dickinson University, Teaneck	1
Federal City College	1
Florida Southern University	1
Florida, University of	2
Fordham University	3
Franklin and Marshall College	1
Geneva College	58
George Washington University	9
Georgetown University	1
Gettysburg College	2
Gonzaga University	1
Goucher College	1
Hamilton College	2
Hartford, University of	6
Harvard University	1
Harvey Mudd College	1
Haverford College	2
Hiram College	1
Hobart College	2
Hofstra University	2
Holy Cross, College of the	1
Hood College	2
Howard University	1
Illinois, University of, at Urbana-Champaign	4
Indiana University at Bloomington	1
Iowa State University of Science and Technology	7
Johns Hopkins University	1
Kalamazoo College	3
Kansas, University of	1
Kentucky, University of	1
Kirkland College	2
Lafayette College	1
Lehigh University	2
Lewis and Clark College	1
London, University of	1
Loyola College	1
Macalester College	1
Manhattan College	2
Manhattanville College	2
Marshall University	1
Mary Manse College	12
Maryland, University of	2
Massachusetts Institute of Technology	1
Massachusetts, University of—Amherst	1
McGill University	3
Miami University	2
Miami, University of	5
Michigan, University of	1
Middlebury College	1
Mills College	1
Minnesota, University of	1
Missouri, University of—Kansas City	1
Montana State University	1
Morehouse College	1
Mount Holyoke College	4
Mount Union College	1
Muhlenberg College	4

Muskingum College	1
Newark College of Engineering	1
New Hampshire, University of	1
New Mexico State University	1
New York, City University of:	
Brooklyn College	1
City College	3
Hunter College	1
New York, State University of:	
at Albany	3
at Buffalo	2
at Stony Brook	1
New York University	10
North Carolina Agricultural and Technical State University	1
North Carolina, University of, at Chapel Hill	2
North Dakota, University of	3
Northeastern University	1
Northern Arizona University	1
Northwestern University	5
Notre Dame, University of	2
Oberlin College	1
Occidental College	1
Ohio Northern University	1
Ohio State University	2
Ohio Wesleyan University	1
Oregon State University	1
Oregon, University of	2
Pacific College	1
Pacific School of Religion	1
Pennsylvania State University	6
Pennsylvania, University of	16
Pittsburgh, University of	1
Polytechnic Institute, University of Industrial Chemistry, Rumania	1
Princeton University	5
Providence College	1
Purdue University	3
Rensselaer Polytechnic Institute	1
Rhode Island, University of	3
Rochester, University of	4
Rutgers University, New Brunswick	8
St. Anselm's College	2
St. John's University, N.Y.	2
St. Joseph's College, Pa.	1
St. Lawrence University	3
St. Olaf College	
St. Peter's College	
St. Vincent College	
Santa Clara, University of	
Smith College	
South Dakota State University	
South Dakota, University of	
Southern California, University of	
Southern Illinois University	
Stanford University	
Stetson University	
Stonehill College	
Swarthmore College	
Syracuse University	
Temple University	
Texas, University of, at Austin	
Trinity College, Conn.	
Trinity College, D.C.	
Tufts University	
Tulane University of Louisiana	
Union College, N.Y.	
U.S. Air Force Academy	
U.S. Military Academy	
Utah State University	
Utah, University of	
Vassar College	
Vermont, University of	
Villanova University	
Virginia, University of	
Washington and Jefferson College	
Washington and Lee University	
Washington State University	
Washington University	
Washington, University of	
Weber State College	
Wellesley College	
Wesleyan University	
Western Maryland College	
Wheaton College, Mass.	
Wheeling College	
Whitman College	
Wisconsin, University of—Madison	
Wooster, College of	
Wyoming, University of	
Yale University	
Yeshiva University	

Number of college graduates ..... 502 Number of institutions represented 203

Recipients of the Degree of Doctor of Medicine, 1973

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Elizabeth Granger Adams, Massachusetts B.A. 1966, Wellesley College	†Children's Hospital National Medical Center, Washington, D.C.
James Williams Adkins, Connecticut B.A. 1969, Wesleyan University	†Northwestern University Medical Center Chicago, Illinois
Seena Carol Aisner, Michigan B.S. 1969, Wayne State University	Johns Hopkins University Hospital, Baltimore, Maryland
Robert Frank Bader, California B.A. 1969, University of California, Los Angeles	New York Medical College—Metropolitan Hospital, New York, New York
Joseph Charles Banis, Jr., California B.S. 1969, Loyola University of Los Angeles	Los Angeles County—University of Southern California Medical Center, Los Angeles, California
Charles Francis Barbiere, New York B.A. 1969, New York University	Lenox Hill Hospital, New York, New York
Bernard Norman Bass, Massachusetts B.A. 1969, George Washington University	Veterans Administration Hospital, Washington, D.C.
Wendell James Bentley, Utah (With Distinction) B.S. 1970, University of Utah	†Stanford University Hospital, Stanford, California
Norman Roger Bishop, Maryland B.S. 1969, George Washington University	George Washington University Hospital, Washington, D.C.
Nathan Mark Bobrow, Maryland B.A. 1971, George Washinvton University	†Washington Hospital Center, Washington, D.C.
Luis Bogran, Honduras B.S. 1968, George Washington University	Charity Hospital of Louisiana, Louisiana State University Division, New Orleans, Louisiana
Bruce Charles Bollinger, Colorado B.S. 1969, George Washington University	Grady Memorial Hospital, Atlanta, Georgia
David Warwick Boxall, Wisconsin B.Arch 1968, Carnegie-Mellon University	University of Minnesota Hospital, Minneapolis, Minnesota
Richard Barclay Boyd, Massachusetts	†Rockford Medical Education Foundation, Rockford, Illinois
Brian Dalen Brantner, California B.A. 1968, California Lutheran College	†University of California Hospital, Los Angeles, California
Warren Lewis Broughton, Maryland (With Distinction) B.A. 1970, George Washington University	Bethesda Naval Hospital, Bethesda, Maryland
Darrell Howard Burstein, Connecticut B.S. 1969, Trinity College, Conn.	Los Angeles County—University of Southern California Medical Center, Los Angeles California
Thomas Ralph Callihan, Ohio B.A. 1969, Kenyon College	University of Kentucky Medical Center, Lexington, Kentucky
Lenart Charles Ceder, Washington B.A. 1969, University of Washington	Emanuel Hospital, Portland, Oregon
William David Chase, Jr., Michigan B.A. 1969, University of Michigan	†St. Joseph's Hospital Health Center, Syracuse, New York
Alan Samuel Colt, Texas B.A. 1969, Colby College	†Children's Hospital National Medical Center, Washington, D.C.
Wayne Douglas Cooper, New Jersey B.A. 1969, Alfred University	†George Washington University Hospital, Washington, D.C
Theodore Lawrence Crandall, North Dakota B.A. 1969, University of North Dakota	Presbyterian-University Hospital, Pittsburgh, Pennsylvania

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments[a]
Dianne Louise Cresswell, Maryland B.S. 1968, Muskingum College	†George Washington University Hospital, Washington, D.C.
Robert Philip Cricco, New Jersey B.S. 1969, Fairfield University	Mary Hitchcock Memorial Hospital, Hanover, New Hampshire
Thomas Rankin Crock, Pennsylvania B.A. 1969, Johns Hopkins University	†Mary Hitchcock Memorial Hospital, Hanover, New Hampshire
David Ralph Curfman, Ohio B.A. 1965, Columbia Union College M.S. 1967, George Washington University	George Washington University Service, D.C. General Hospital, Washington, D.C.
Anthony John DeFranzo, Jr., Connecticut B.S. 1969, Trinity College, Conn.	Boston City Hospital, Boston, Massachusetts
Frederick Jules Dunner, Maryland B.S. 1967, George Washington University	Western Pennsylvania Hospital, Pittsburgh, Pennsylvania
Stephen Thomas Earls, Massachusetts B.A. 1970, George Washington University	†Miriam Hospital, Providence, Rhode Island
Dion Ralph Ehrlich, New York B.A. 1969, Franklin and Marshall College	Washington Hospital Center, Washington, D.C.
Patricia Ann Feller, New Jersey B.A. 1969, Rutgers University, New Brunswick	Montefiore Hospital, Bronx, New York
Frank Louis Fiaschetti, New York B.S. 1969, Muhlenberg College	Los Angeles County Harbor General Hospital, Torrance, California
Brian Spencer Frist, New York B.S. 1969, American University	George Washington University Hospital, Washington, D.C.
Loren Scott Funt, Florida B.A. 1971, George Washington University	Georgetown University Service, Veterans Administration Hospital, Washington, D.C.
Robert Allan Gatlin, California B.A. 1969, Stanford University	†Cincinnati General Hospital, Cincinnati, Ohio
Elliot Stephen Gersh, California B.S. 1969, Ohio State University	†Children's Hospital National Medical Center, Washington, D.C.
Geoffrey Stephen Gladstein, Connecticut B.A. 1969, University of Connecticut	Albany Hospital, Albany, New York
William Clark Gray, Maryland (With Distinction) B.S. 1969, University of Maryland	†University of Maryland Hospital, Baltimore, Maryland
Ernest Dalton Hanowell, California B.S. 1969, University of California, Davis	George Washington University Service, D.C. General Hospital, Washington, D.C.
Susan Thistlethwaite Hanowell, Maryland B.A. 1969, Lycoming College	†Children's Hospital National Medical Center, Washington, D.C.
Jeffrey David Harris, New York B.A. 1968, Hofstra University	†Beth Israel Medical Center, New York, New York
Alexander Ostrow Hauptman, New Jersey B.A. 1967, American University	Highland General Hospital, Oakland, California
Joel Harvey Heller, Virginia B.S., B.Phar. 1968, Rutgers University, New Brunswick	†York Hospital, York, Pennsylvania
Robert Chung-Hwei Hsieh, District of Columbia B.S. 1969, George Washington University	Washington Hospital Center, Washington, D.C.
Bruce Clyde Hunter, Utah B.S. 1969, Weber State College	Walter Reed Army Medical Center, Washington, D.C.

[a] Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Steven Edward Isaacs, New York B.S. 1967, St. Lawrence University	Mount Sinai Hospital, New York, New York
Jeffrey Stephen Javerbaum, New Jersey B.A. 1969, Cornell University	George Washington University Hospital, Washington, D.C.
Mark Yarwood Johnson, Washington B.S. 1969, University of Washington	Los Angeles County—University of Southern California Medical Center, Los Angeles, California
Randall Karl Johnson, Minnesota B.A. 1969, University of Minnesota B.S. in Med. 1971, University of South Dakota	University of Michigan Affiliated Hospitals, Ann Arbor, Michigan
Pamela Ann Kaires, New York B.S. 1969, State University of New York at Stony Brook	U.S. Naval Hospital, San Diego, California
Mireille Bonhomme Kanda, Haiti B.S. 1969, American University	†Children's Hospital National Medical Center, Washington, D.C.
Scott Eugene Kerns, Michigan B.S. 1969, University of Michigan	Mount Auburn Hospital, Cambridge, Massachusetts
Cheryl Ann Kohl, North Carolina B.A. 1969, Duke University	†University of Michigan Affiliated Hospitals, Ann Arbor, Michigan
Garry Richard Kolb, California B.S. 1968, California Polytechnic State University	Veterans Administration Center Hospital, Los Angeles, California
Kerry Lee Kuhn, New York B.A. 1970, George Washington University	Kings County Hospital Center, Brooklyn, New York
Lawrence Merion Mandel Lavine, Maryland B.S. 1965, Florida State University M.S. 1967, University of Wisconsin—Madison	†Southern Illinois University Hospital, Springfield, Illinois
Willard Steven Leeper, California B.S. 1970, Brigham Young University	†Maricopa County General Hospital, Phoenix, Arizona
Leo Marx Leva, Maryland B.A. 1968, Swarthmore College	Highland Hospital of Rochester, Rochester, New York
Ronald Howard Levin, Connecticut B.A. 1969, Clark University	Hartford Hospital, Hartford, Connecticut
Alan Albert Lewin, New Jersey B.A. 1969, Temple University	Mount Sinai Hospital, New York, New York
Allan Jefferson Lewis, Arizona B.B.A. 1949, Texas Tech University	Kerns County Hospital, Los Angeles, California
David George Lewis, Utah B.S. 1969, University of Utah	†Barnes Hospital, St. Louis, Missouri
Nathan Wise Lipsett, New Jersey B.A. 1969, Kenyon College	University Hospital—Veterans Administration (Manhattan), New York, New York
David Martin Liverett, Maryland B.A. 1969, University of Virginia	George Washington University Service, D.C. General Hospital, Washington, D.C.
Alan Stuart Luria, Florida B.A. 1969, University of Michigan	University of Miami Affiliated Hospitals, Miami, Florida
Kenneth Francis Mangan, Massachusetts B.S. 1969, University of Massachusetts, Amherst	George Washington University Hospital, Washington, D.C.
Michael Dennis Manley, California (With Distinction) B.A. 1967, M.A. 1970, California State University, Sacramento	Los Angeles County Harbor General Hospital, Torrance, California

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Edward Roy Margules, California B.A. 1968, University of California, Los Angeles	University of California Medical Center, San Francisco, California
Jeffrey Paul Miller, Mississippi B.S. 1968, Randolph-Macon College	Los Angeles County—University of Southern California Medical Center, Los Angeles, California
Marc Alain Mugmon, Maryland B.S. 1972, Georgetown University	University of Maryland Hospital, Baltimore, Maryland
Salvatore Muleh, Connecticut B.S. 1969, University of Connecticut	†Institute of Living, Hartford, Connecticut
Courtland LeBrandt Myles, District of Columbia B.S. 1968, American University	St. Elizabeths Hospital, Washington, D.C.
Kenneth Lawrence Partlow III, Washington	Miriam Hospital, Providence, Rhode Island
Michael John Paszek, Connecticut B.S. 1969, Trinity College, Conn.	University of Virginia Hospital, Charlottesville, Virginia
David Alan Paul, Maryland B.A. 1968, Rutgers University, New Brunswick	Sinai Hospital of Baltimore, Baltimore, Maryland
B. Warren Pechan, New York B.A. 1969, Cornell University	Cleveland Clinic Hospital, Cleveland, Ohio
Juan Carlos Diego Penhos, Argentina B.A. 1970, George Washington University	†Springfield Hospital Medical Center, Springfield, Massachusetts
John Robert Peters, New York B.A. 1969, New York University	†University of Minnesota Hospital, Minneapolis, Minnesota
Arnold Gilbert Phillips, Maryland B.A. 1962, M.S. 1963, Wayne State University	†Case Western Reserve University Affiliated Hospitals, Cleveland, Ohio
Richard Mordecai Powell, Pennsylvania B.A. 1968, Temple University	†Lankenau Hospital, Philadelphia, Pennsylvania
George Ralph Prioleau, Jr., South Carolina B.S. 1969, South Carolina State College	†University of California Medical Center, San Francisco, California
Robert Craig Ripley, California (With Distinction) B.A. 1968, University of California, Berkeley	Vanderbilt University Affiliated Hospitals, Nashville, Tennessee
Jesse Samuel Rosenthal, New York B.A. 1969, George Washington University	†Mount Sinai Hospital, New York, New York
Stuart Evan Ross, District of Columbia B.A. 1969, University of Pennsylvania	Washington Hospital Center, Washington, D.C.
Eugene William Rumsey, Jr., California B.A. 1969, California State University, San Diego	†University Hospital of San Diego County, San Diego, California
Jeffrey Mark Saffer, New Jersey B.A. 1969, Dartmouth College	Maine Medical Center, Portland, Maine
Robert Richard Schade, New York B.A. 1969, Colgate University	Presbyterian—St. Luke's Medical Center, Chicago, Illinois
Ronald Charles Schliftman, New York B.A. 1969, George Washington University	University of Miami Affiliated Hospitals, Miami, Florida
Allan Schonberg, New York B.S. 1966, Bethany College, W.Va.	University Hospital of Jacksonville, Jacksonville, Florida
Harvey Harris Shapiro, Illinois B.A. 1965, Reed College	†University of Oregon Medical Hospitals, Portland, Oregon

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Paul Timothy Siemers, Illinois (With Distinction) B.S. 1968, University of Illinois at Urbana-Champaign	†University Hospital of San Diego County, San Diego, California
Eugene David Silverman, District of Columbia B.A. 1970, George Washington University	†New York University Medical Center, New York, New York
Lois Frances Smith, Virginia B.S. 1969, Dickinson College	
Richard Joseph Smith, Jr., North Dakota B.S. 1969, B.S. in Med. 1971, University of North Dakota	George Washington University Hospital, Washington, D.C.
Stephen Jay Smolansky, New York B.A. 1969, Temple University	Bronx Municipal Hospital, Bronx, New York
Arthur Lewis Soben, New Jersey B.A. 1969, Rutgers University, New Brunswick	Medical University of South Carolina Hospital, Charleston, South Carolina
Scott Kim Sokol, New York B.A. 1969, Syracuse University	Long Island Jewish—Hillside Medical Center, New Hyde Park, New York
Charles Richard Spero, New York B.S. 1969, Columbia University	†Lenox Hill Hospital, New York, New York
Howard David Stang, New Jersey B.S. 1969, Rutgers University, New Brunswick	Presbyterian—University Hospital, Pittsburgh, Pennsylvania
Barry Craig Stewart, Washington B.A. in Bus. Adm. 1962, University of Washington	Good Samaritan Hospital, Phoenix, Arizona
Timothy Patrick Sullivan III, New Jersey B.S. 1969, St. Peter's College	George Washington University Service, D.C. General Hospital, Washington, D.C.
Frederick James Sutton, Maryland B.A. 1969, Cornell University	University of Maryland Hospital, Baltimore, Maryland
Ronald Charles Sweet, Ohio (With Distinction) B.S. 1969, Wright State University	†George Washington University Hospital, Washington, D.C.
Ellen Irma Tamagna, Maryland B.A. 1969, Goucher College	Montefiore Hospital, Pittsburgh, Pennsylvania
Jane Ellen Seyler Thomas, Ohio B.A. 1968, Cornell University M.S. 1970, Ohio State University	†Children's Hospital National Medical Center, Washington, D.C.
Thomas Thomas, Jr., Pennsylvania B.A. 1967, M.S. 1969, Pennsylvania State University	University of Miami Affiliated Hospitals, Miami, Florida
Charles Kenneth Travers, Jr., Maryland (With Distinction) B.S. 1969, University of Maryland	†George Washington University Hospital, Washington, D.C.
Howard Michael Uman, Massachusetts B.A. 1969, Amherst College	†University of Michigan Affiliated Hospitals, Ann Arbor, Michigan
Donald Theron Van de Water, Florida B.S. 1969, George Washington University	General Rose Memorial Hospital, Denver, Colorado
Joseph Nelson Van der Werf, Pennsylvania B.S. 1969, Duke University	University of Oregon Medical Hospitals, Portland, Oregon
Keith William Van Meter, Washington B.A. 1967, Miami University	Charity Hospital of Louisiana—Tulane University Division, New Orleans, Louisiana
Fernando Acosta Villarreal, Mexico B.A. 1970, George Washington University	Good Samaritan Hospital, Dayton, Ohio

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies

Name, State of Residence, Degree Held	Internship and Residency Appointments*
Timothy George Wex, Wisconsin B.A. 1969, Johns Hopkins University	Bethesda Naval Hospital, Bethesda, Maryland
Morris Jack Wilkenfeld, New Jersey B.A. 1969, Lafayette College	George Washington University Service, Veterans Administration Hospital, Washington, D.C.
Douglas Drew Wilson, Ohio B.S. 1969, Wright State University	†University Hospital, Madison, Wisconsin
Stephen Charles Wilson, California B.S. 1969, University of Southern California	Los Angeles County Harbor General Hospital, Torrance, California
Kenneth Jordan Wright, Connecticut B.S. 1969, Trinity College, Conn.	†Hartford Hospital, Hartford, Connecticut
Anthony Pat Yates, Pennsylvania B.A. 1969, St. Vincent College	Roger Williams General Hospital, Providence, Rhode Island
Kae Strosnider Yingling, Maryland B.S. 1969, University of Maryland	George Washington University Hospital, Washington, D.C.
Elmer Yu, Delaware B.A. 1968, Plymouth State College	†University of New Mexico Affiliated Hospitals, Albuquerque, New Mexico
Thomas Martin Zarchy, New York B.S. 1969, Trinity College, Conn.	University of Miami Affiliated Hospitals, Miami, Florida

* Appointments listed here are Internships, except those preceded by a dagger (†), which are Residencies.

APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason:

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs†

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

of The George Washington University as soon after order is restored as practicably possible.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle in the students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968:*

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research and learning, or

* Amended January 18, 1973.

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

COLLEGE OF GENERAL STUDIES, Dean of the College

NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

UNDERGRADUATE AND GRADUATE CATALOGUE (Arts and Sciences, Education, Government and Business Administration, Public and International Affairs), Office of Admissions

SCHOOL OF MEDICINE AND HEALTH SCIENCES, Admissions Office, School of Medicine and Health Sciences

SUMMER SESSIONS CATALOGUE, Dean of the Summer Sessions

SCHEDULE OF CLASSES: FALL AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.Forens.S.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S. in Forens.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.), Bachelor of Science (B.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), and Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelor of Science in Physical Education (B.S. in P.E.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.) and Master of Arts (M.A.)

8/74—CORNELIUS—12M

COLLEGES AND SCHOOLS—DEGREE PROGRAMS

COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

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SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.), Bachelor of Science (B.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

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SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.) and Master of Arts (M.A.)

8/74—CORNELIUS—12M

THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

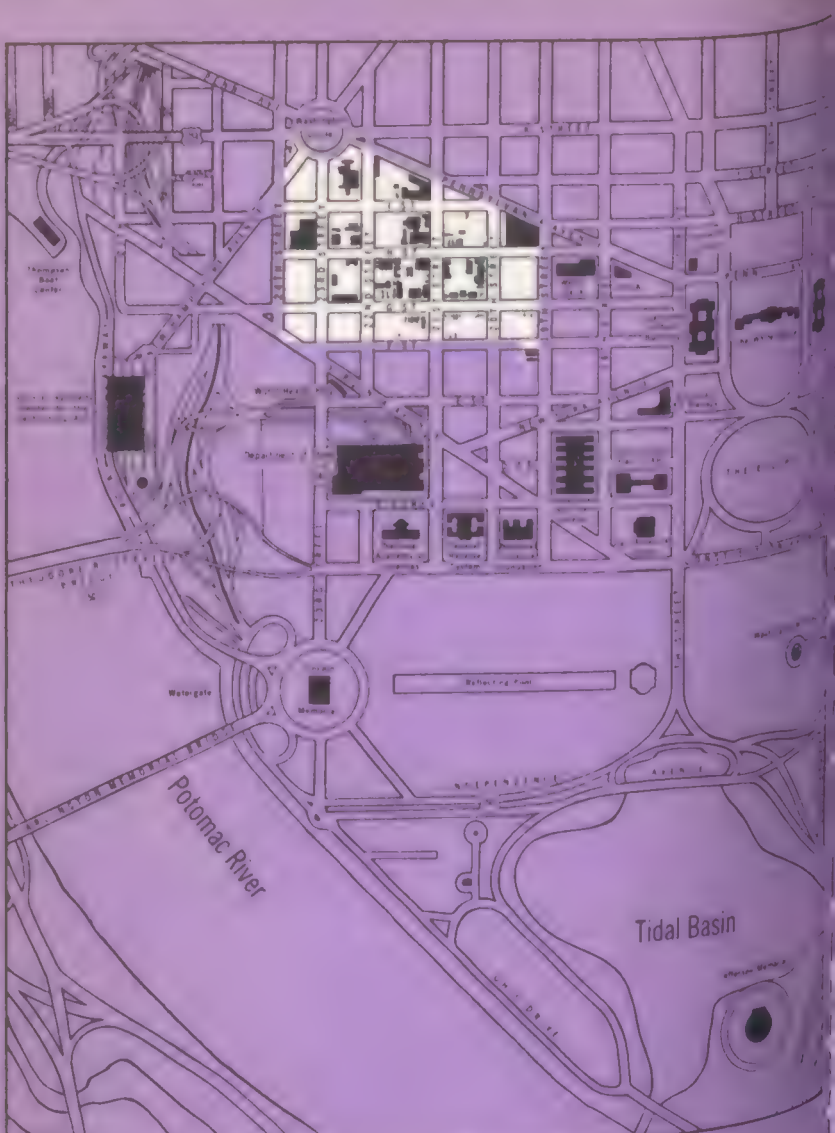
THE DIVISION OF EXPERIMENTAL PROGRAMS, 1973

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Vol. LXXIII, No. 11, September, 1974



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1974-1975



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THE CALENDAR 1974–75*

AUGUST 1974

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1974 SUMMER TERM

May 28	Registration for all sessions (12 am–6:30 pm) *Tuesday* Application for September 30 graduation due as part of registration
May 29	First-session and 13-week session classes begin *Wednesday*
July 4	Holiday *Thursday*
July 8	First-session classes end *Monday*
**July 9–11*	First-session examination period *Tuesday–Thursday*
July 12	Registration for students attending 2nd session only (2–6 pm) *Friday* Application for September 30 graduation due as part of registration
July 15	Second-session classes begin *Monday*
August 21	Last day of classes *Wednesday*
August 22–24	Second-session and 13-week session examination period *Thursday–Saturday*

* Courses in the 13-week session will meet on their regularly scheduled days during the week of July 8.

1974–75 FALL SEMESTER

August 22–23	Registration *Thursday* (12:30–7 pm)—*Friday* (3–7 pm) Application for February graduation due as part of registration
August 26	Classes begin *Monday*
September 2	Labor Day (holiday) *Monday*
October 4	S.J.D. dissertations of February candidates due *Friday*
November 27	Thanksgiving recess begins after last class *Wednesday*
December 2	Classes resume *Monday*
December 4	Last day of fall-semester classes *Wednesday*
December 5–20	Examination period for students other than those students in the first-year J.D. degree program *Thursday–Friday*
January 2	LL.M. theses of February candidates due *Thursday*
January 3, 6, 8	Examination period for students in the first-year J.D. degree program *Friday, Monday, Wednesday*

1975 SPRING SEMESTER

**January 13–14*	Registration *Monday–Tuesday* Application for May graduation due as part of registration
January 15	Classes begin *Wednesday*
January 31	S.J.D. dissertations of May candidates due *Friday*
February 17	Winter Convocation (holiday) *Monday*
March 10	Application for 1974–75 teaching fellowships due *Monday*
March 29	Spring recess begins after last class *Saturday*
April 7	Classes resume *Monday*
April 28	LL.M. theses of May candidates due *Monday*
April 30	Last day of spring-semester classes *Wednesday*
May 1–17	Examination period *Thursday–Saturday*
May 25	Commencement *Sunday*

*Hours of registration to be announced.



THE NATIONAL LAW CENTER

HISTORY

THE LAW CENTER, the oldest law school in the District of Columbia, was established in 1865 with a formal program of two years of study. This was largely through the efforts of the Reverend George Whitefield Samson, President of Columbian College, whose action resulted in the purchase of a separate building for holding law classes. The building had belonged to Trinity Church, in which Francis Scott Key had been Senior Warden. It was occupied by the Law Center until 1884.

Sixty graduates, from twenty-two of the then thirty-seven states, received degrees in 1867. The school continued to have a student body and a faculty which reflected the fact that it was at the seat of our nation's government. Associate Justices David J. Brewer and John Marshall Harlan of the Supreme Court of the United States were among the prominent members of the bench and bar who were on the faculty.

In 1877, one year after the first such program was adopted in the United States, the Law Center instituted a course leading to the degree of Master of Laws. In 1898, the course of instruction for the degree of Bachelor of Laws was extended to three years. The Law Center took part in 1900 in the organization of the Association of American Law Schools.

In the past quarter-century the Law Center expanded its course and seminar offerings with consideration of the needs of first-degree and graduate students. The degree of Doctor of Juridical Science was instituted in 1940. The need of foreign lawyers who came to this country and who required additional preparation for law work in the United States resulted in the creation of programs for the degrees of Master of Comparative Law in 1946 and Master of Comparative Law (American Practice) in 1951.

In 1954, National University School of Law, which had an important place in legal education in the District of Columbia since 1869, was absorbed by the George Washington University Law School.

Since 1954, programs of special research and study have enriched the basic curriculum. These include the Environmental Law Program; Patent Law Program; International Law Program; the Government Contracts Program; and Law, Science, and Technology Program.

Additionally, the Law Center has been a leader in developing a curriculum to meet the legal needs of the poor and the disadvantaged. A clinical law

program has been developed which is the equal of that at any law school in the nation. Special projects include the Consumer Protection Center, the George Washington Legal Aid Bureau, the Students-in-Court Program, and individual projects supervised by the Law Students Civil Rights Research Council.

Realizing the need for legal services for all members of society, the National Law Center, while maintaining its strong course offerings in patent law, administrative law, and corporate law, has developed a rich selection of courses in poverty law covering housing, sales, civil rights, and welfare.

Alumni of the National Law Center have included United States Senators, Congressmen, Ambassadors, and Cabinet Members. Its graduates have gone on to become members of both the federal and state judiciaries as well as noted members of the bar of every state in the union.

LOCATION IN THE NATION'S CAPITAL

Of special significance is the location of the National Law Center in the Nation's Capital, the focal point of the law in action, both American and international. The work of the Center goes on in this environment, presenting a unique opportunity for observation and study of federal agencies—judicial, legislative, and administrative. Readily accessible are the Supreme Court of the United States, the federal trial and appellate courts of the District of Columbia, and, in addition, federal courts of special jurisdiction, such as the United States Court of Claims, the United States Court of Customs and Patent Appeals, the Tax Court of the United States, and the Court of Military Appeals. Current federal legislation can be studied as it is considered by Congressional committees and as it comes up for debate on the floors of the House of Representatives and the Senate. With respect to the federal administrative agencies, students here in Washington have matchless opportunities for study and observation. They can attend informal and formal hearings of these agencies and can obtain from the docket sections complete records of administrative adjudication in specific cases. Illustrative of such federal agencies are the Interstate Commerce Commission and the Civil Aeronautics Board in the field of transportation; the Federal Trade Commission in the field of trade regulation; the Securities and Exchange Commission in the field of security issues and corporate finance; the National Labor Relations Board in the field of labor-management relations; the United States Patent Office in the field of patent law; the Federal Power Commission in the field of water, natural gas, and electric power; and the Federal Communications Commission in the field of radio and television.

Supplementing these environmental advantages of law in action are the exceptional research library collections in the Library of Congress, in the various departments of the federal government, and in the libraries of the headquarters of national and international organizations. The notable library of the Carnegie Foundation for International Peace has been acquired by George Washington University for use of research students in international and comparative law. fields with respect to which Washington has come to be called "The Capital of the World."

The years of residence at law school are years of participation in the life of the community, which in the case of the George Washington University National Law Center is the government of the United States. As a consequence, the study of law takes on added meaning, whether the goal be government

ervice or practice, general or specialized, and whatever the community in which the student plans to practice.

OBJECTIVES

The purpose of the National Law Center is to prepare men and women to meet the needs of society in many fields of law. As a national law school, the Center does not emphasize any particular geographic area in its instruction; therefore, it prepares students to practice law in any part of the country. The Center also offers a program of legal education for foreign students. The Law Center seeks to fulfill these objectives through (1) a rich and varied curriculum taught by eminent professors and highly qualified specialized instructors; (2) an extensive clinical law program where students learn legal skills by actual practice; (3) two law journals which specialize in public law and international law; (4) trial practice; (5) participation in the Van Vleck Appellate Case Club (a moot court competition); (6) a series of student professional co-curricular activities; (7) studies on an advanced level for foreign as well as for American students; and (8) a continuing legal education program for members of the bar.

THE NATIONAL LAW CENTER COMPLEX

The National Law Center Complex consists of three buildings: Stockton Hall, Bacon Hall, and the Jacob Burns Law Library.

STOCKTON HALL

Stockton Hall is the main classroom building. It also holds faculty offices and the offices of the Dean and the Associate Deans of the Law Center, as well as the Records Office and student lounges.

BACON HALL

Bacon Hall houses faculty offices; student lounges; the *George Washington Law Review* Office; the Institute of Law, Psychiatry, and Criminology; the Government Contracts Program; the Admissions Office; the Law Center Placement Office; the offices of the *Journal of International Law and Economics*; the Black America Law Student Association; the Law Students Civil Rights Research Council; the Van Vleck Appellate Case Club; the *Advocate*, the law school newspaper; the Student Bar Association; the Consumer Protection Center; the Legal Aid Bureau; and La Raza, the national Chicano law students association.

THE JACOB BURNS LAW LIBRARY

The Law Library of substantially over 130,000 volumes is housed in the modern Jacob Burns Law Library Building, adjoining Stockton Hall on the south side. This facility, opened for use on October 1, 1967, comprises nine floor and deck levels with about 49,000 square feet of floor space. Its shelf capacity

now in place will accommodate over 170,000 volumes; with supplementary shelving in Stockton Hall and a small branch for the *Law Review* in Bacon Hall, the library provides space for almost 200,000 volumes. Seating for more than 450 readers is provided in four reading rooms, lounge and smoking areas, carrels, enclosed study cubicles, semi-private reading alcoves, and seminar rooms. Three photocopy machines are provided for reader use.

The collections comprise a comprehensive working library of Anglo-American law, with supplementary material in disciplines peripheral to law (such as business, finance, labor relations, sociology, criminology, political science, biography, foreign affairs, and others). Special areas are maintained for collections in tax law, labor law, patent-trademark-copyright law, international law, and foreign and comparative law. Included in the collections are the appellate decisions of all state courts and decisions of the federal courts, with comprehensive collections of English and Canadian court decisions; the currently annotated statutes of the 50 states; all federal statutes; English and Canadian statutes; selected statutes of other nations; and an extensive periodical collection, kept current by more than 950 subscriptions, covering virtually all American legal periodicals and most of those published in English throughout the world. The library is strong in its treatise holdings, administrative and regulatory materials, and Congressional coverage. The growing international law holdings include virtually complete collections of United Nations printed material and that of the European Economic Community, all recent material from the International Labor Organization, and current and retrospective collections of international treaties. A large portion of the holdings of the former library of the Carnegie Endowment for International Peace, acquired by the University in 1950, are in the Law Library.



The Juris Doctor Degree Program

ENTRANCE REQUIREMENTS

For information on "Application for Admission" to the Juris Doctor degree program, see page 28. Admission to candidacy for the degree of Juris Doctor requires a Bachelor of Arts or equivalent degree from an accredited college or university, a satisfactory quality of work, and an acceptable distribution of courses. Any substantial number of hours taken on a pass-fail or other ungraded basis may be seriously detrimental to an applicant's chances for admission. Eligibility is based on personal and scholastic records and on the result of the Law School Admission Test. No applicant will be acceptable in transfer who is ineligible to return in good standing to a previously attended law school. From the applicants, a selection is made by the Committee on Admissions.

Information concerning the Law School Admission Test may be obtained from the Dean of the National Law Center or from the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947 Center Street, Berkeley, Calif. 94704. The test is administered at various centers in the United States. It is anticipated that the testing dates for 1973–74 will be in October, December, February, April, and July. Completed application blanks and fees must be received by the Educational Testing Service at least two weeks before the date of the test. It is not necessary that formal application for admission be made prior to taking the test.

ADVANCED STANDING

In unusual circumstances, advanced standing toward the degree of Juris Doctor may be granted for work of high quality successfully completed in other law schools which are members of the Association of American Law Schools or are approved by the American Bar Association. Transferred credits will not be recognized in excess of those which might be earned in a similar period in the National Law Center.

Advanced standing will not be granted for law work already counted toward the Bachelor of Arts or other pre-legal degree.

TUITION DEPOSIT

Every student admitted to the National Law Center as a candidate for the degree of Juris Doctor must submit a tuition deposit ($100 initially plus $350 later) after receipt of notification of acceptance. This deposit is credited toward tuition and is refundable only in cases of applicants called into military service.

PROFILE OF THE CLASS ENTERING IN THE FALL SEMESTER 1973–74

The first-year class of approximately 400 students was selected from more than 7,000 applicants from 650 colleges and universities. Applications were received from every state in the union. Twenty-eight per cent of the first-year class are women.

The following colleges and universities are each represented by three or mor members of the first-year class: American University; Amherst College; Bosto University; Brown University; Columbia University; Cornell University; Dart mouth College; Duke University; George Washington University; Georgetow University; Grinnell College; Harvard University; Johns Hopkins University Mount Holyoke College; New York University; Northwestern University; Obe lin College; Pennsylvania State University; Princeton University; Purdue Un versity; Smith College; Stanford University; State University of New York a Binghamton; State University of New York at Buffalo; State University of Ne York at Stony Brook; Syracuse University; Tufts University; United States Air Force Academy; United States Military Academy; United States Naval Aca demy; University of California, Berkeley; University of Chicago; University of Colorado; University of Maryland; University of Michigan; University of Ne braska; University of Notre Dame; University of Pennsylvania; University of Pittsburgh; University of Rochester; University of Southern California; Univer sity of Texas at Austin; University of Virginia; University of Washington; Un versity of Wisconsin—Madison; Washington University; Wellesley College Williams College; Yale University.



THE CURRICULUM

The curriculum for the degree of Juris Doctor at the National Law Center offers the candidate one of the largest and most varied selections of courses in the country. The first-year student is required to take courses in Civil Procedure; Constitutional Law; Contracts; Criminal Law and Procedure; Legal Research, Writing, and Professional Responsibility and Ethics; Property; and Torts. These courses give the student the basis upon which all further legal study is built. In the second and third years of study, the student must take Evidence and fulfill a two-credit legal writing requirement. Beyond these requirements the student is free to choose from the many course and project offerings. The Law Center prides itself on allowing the student freedom to design his own program of study.

The curriculum is organized so that students may begin the study of law for the Juris Doctor degree only at the start of the fall semester. Transfer students may enter at the start of the spring semester also.

DAY DIVISION

First Year

FALL SEMESTER		SPRING SEMESTER	
Contracts I	4	Contracts II	2
Torts	4	Property	4
Criminal Law and Procedure	4	Constitutional Law	4
Legal Research, Writing, and Professional Responsibility and Ethics	2	Civil Procedure	4
Total semester hours	14	Total semester hours	14

Second Year

FALL SEMESTER		SPRING SEMESTER	
Elective	14	Evidence	4
		Elective	10
Total semester hours	14	Total semester hours	14

Third Year

FALL SEMESTER		SPRING SEMESTER	
Elective	12	Elective	14
Legal writing requirement	2		
Total semester hours	14	Total semester hours	14

This requirement may be satisfied by service on the *Law Review*, by satisfactory completion of a seminar which requires a research paper, or by satisfactory completion of Law 344, *Legal Writing*.

EVENING DIVISION

First Year

FALL SEMESTER		SPRING SEMESTER	
Contracts I	4	Contracts II	4
Torts	4	Criminal Law and Procedure	4
Legal Research, Writing, and Professional Responsibility and Ethics	2	Civil Procedure	2
Total semester hours	10	Total semester hours	10

Second Year

FALL SEMESTER		SPRING SEMESTER	
Property	4	Constitutional Law	4
Elective	6	Elective	6
Total semester hours	10	Total semester hours	10

Third Year

FALL SEMESTER		SPRING SEMESTER	
Elective	8	Evidence	4
*Legal writing requirement	2	Elective	6
Total semester hours	10	Total semester hours	10

Fourth Year

FALL SEMESTER		SPRING SEMESTER	
Elective	10	Elective	10
Total semester hours	10	Total semester hours	10

Summer Term or Ninth Semester

Elective	4

REQUIREMENTS FOR THE DEGREE

The student must have completed a residence period of three academic years (four years for evening students) and 84 semester hours of required and elective courses, with a cumulative average of at least 65. At least one academic year of residence and 28 semester hours are required of students admitted with

* This requirement may be satisfied by service on the *Law Review*, by satisfactory completion of a seminar which requires a research paper, or by satisfactory completion of Law 344, *Legal Writing*

advanced standing. The work of the final semester or summer session must be completed while in residence at the National Law Center. Credits allowed by way of advanced standing are not included in computing the average required for graduation.

Graduation Requirements.—See page 43 for a statement of the graduation requirements.

RESIDENCE

Candidates for the Juris Doctor degree must complete a residence period of three academic years. Attendance in the day division for the fall and spring semesters constitutes residence for an academic year; similar attendance in the evening division constitutes residence for three-fourths of an academic year. Consequently, a day student must attend 6 semesters to meet residence requirements; an evening student must attend 8. Students authorized to take schedules of less than 10 hours in the day division or less than 6 hours in the evening division receive residence credit on a proportional basis. Students who attend the summer sessions receive fractional residence credit.

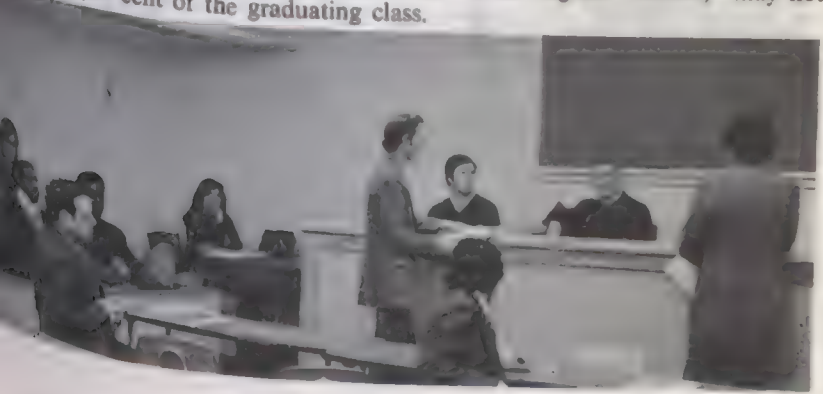
HONORS

The following regulations apply to Juris Doctor candidates graduating in May, 1976, and after. For students graduating prior to May, 1976, the former regulations apply.

The degree of Juris Doctor "With Highest Honors" is awarded to those students, not exceeding 3 per cent of the graduating class, who have obtained the highest cumulative averages of at least 85 or better.

The degree of Juris Doctor "With High Honors" is awarded to those students with the highest cumulative averages of 80 or better. The number of students receiving degrees "With High Honors," when added to the total number of students receiving degrees "With Highest Honors," may not exceed 10 per cent of the graduating class.

The degree of Juris Doctor "With Honors" is awarded to those students with the highest cumulative averages of 75 or better. The number of students receiving degrees "With Honors," when added to the total number of students receiving degrees "With High Honors," and "With Highest Honors," may not exceed 40 per cent of the graduating class.



ORDER OF THE COIF

The Order of the Coif, a national legal honor society, aims "to foster a spir of careful study and to mark in a fitting manner those who have attained high grade of scholarship." The George Washington University Chapter wa established in 1926. Members are elected each year from the highest-rankin 10 per cent of the graduating Juris Doctor candidates.

PUBLICATIONS

The *George Washington Law Review*, published five times a year, is edite and managed by the students of the National Law Center. The *Law Review* is known for its emphasis on federal and public law; however, it is also de voted to research in other important legal areas. The staff of the *Law Review* is selected on the basis of a writing competition and on the basis of grades The editorial board is selected from those students who have successfully com pleted the first year of *Review* work. Students receive 4 semester hours of academic credit for the two-year program.

The *Journal of International Law and Economics*, managed and edited by law students, is a biannual publication of the Law Center. It presents articles and commentaries on public and private international financial developments comparative law, and international law. The staff of the *Journal* is selected through a writing competition, and students earn academic credit for their work.

MOOT COURT

The Van Vleck Appellate Case Club provides realistic training in appellate oral advocacy for students in the National Law Center. Each year two competitions are held: the upperclass competition is held in the fall and the first-year competition is held in the spring.



LAW CENTER ORGANIZATIONS

BLACK AMERICA LAW STUDENT ASSOCIATION (BALSA)

The Black America Law Student Association is a national Black law students organization which has chapters at some 80 law schools. BALSA sponsors law speakers and various programs.

INTERNATIONAL LAW SOCIETY

The International Law Society is an organization of students interested in the practice of international law. The Society sponsors speakers and various programs.

LA RAZA

A national Chicano law students organization which has chapters at various law schools, La Raza sponsors law speakers and various programs.

LAW FRATERNITIES AND SORORITIES

The chapters of Beta Kappa Pi, Delta Theta Phi, Phi Alpha Delta, and Phi Delta Phi at the National Law Center sponsor speakers and various social occasions.

LAW STUDENTS CIVIL RIGHTS RESEARCH COUNCIL (LSCRRC)

The Law Students Civil Rights Research Council is a national organization of law students concerned with the legal problems of civil rights. LSCRRC offers clinical law projects for which students may receive academic credit.

PATENT LAW CLUB

The Patent Law Club, an organization of students interested in patent and related law, conducts an extensive speakers program as well as various social events.

STUDENT BAR ASSOCIATION

The Student Bar Association is the law student governing body, responsible for allocating funds among the various student organizations. It also conducts a speaker program for the law school. All members of the student body are members of the Student Bar Association.

TAX LAW ASSOCIATION

is an organization of students interested in careers in tax law, the Tax Law Association conducts various programs of interest to tax law specialists.

WOMEN'S RIGHTS COMMITTEE (WRC)

The Women's Rights Committee is an organization of all the women in the law school. It is primarily interested in the place of women in law schools and in the legal profession. WRC conducts seminars and sponsors speakers.

JOINT JURIS DOCTOR—MASTER'S DEGREE PROGRAM

In certain instances, arrangements may be made for students to work concurrently toward both the Juris Doctor degree in the National Law Center and a Master's degree in some fields in the University's Graduate School of Arts and Sciences, School of Government and Business Administration, or School of Public and International Affairs. Fields in which this program is available include Business Administration, Economics, International Affairs, Political Science, Public Administration, and Public Affairs. Students must be admitted both to the National Law Center and, separately, to the School which will confer the Master's degree, and must meet all requirements in each degree program. It is possible for a student to complete work for both degree programs within four years.



Master's and Doctoral Programs

THE ADMINISTRATION OF JUSTICE under law is a matter so vast and complex that some who hold the Bachelor of Laws or Juris Doctor degree feel the need for further study. The Master's and doctoral programs give students the opportunity to broaden and deepen their understanding of the law.

The Master of Laws candidate may follow a program of general study or concentrate in one of the specialized areas listed below. Courses in each of these areas are included in the 401–600 series. Graduates who complete their work in one of these areas may have the field of specialization noted on their diplomas.

Administrative Law: Economic Regulation
Comparative Law
Corporation Law
Environmental Law
Government Procurement Law
International Law
Labor Law
Land Use Management and Control
Law and Poverty
Law, Psychiatry, and Criminology
Law, Science, and Technology
Patent and Trade Regulation Law
Taxation
Urban Legal Studies

Programs leading to the degree of Doctor of Juridical Science offer the advanced student the opportunity to concentrate on research and writing in a specific area of interest to the legal profession.

MASTER OF LAWS

NTRANCE REQUIREMENTS

A Bachelor of Laws, Juris Doctor, or equivalent degree from a law school which is a member of the Association of American Law Schools or is approved by the American Bar Association is required. The applicant must have demonstrated a high degree of academic excellence. Advanced standing is not granted for credits earned while a candidate for the first degree in law.

EGREE REQUIREMENTS

The student must complete a residence period of not less than two semesters, which should be continuous. All requirements for the degree must be completed this Law Center and in a period not exceeding three years from the time of ial graduate registration, unless an extension is granted in writing by the an. The student must complete 24 semester hours of courses and writing ojects with acceptable grades. For all courses taken within the Law Center student must attain the grade of 65 or above. For approved courses taken side the Law Center, the grade of either *CR* (Credit) or *NC* (No Credit) is

assigned. To receive the grade of *CR* (Credit) in a course taken in oth graduate divisions of this University, a student is required to attain the gra of *B* or better. To receive the grade of *CR* (Credit) in a course taken Georgetown University through the Consortium of Universities of the Was ington Metropolitan Area, Inc., a student is required to attain the grade of or better. A minimum cumulative average of 75 is required at all times. Th student is expected to include Law 599–600 *Thesis* in the 24-semester-ho requirement for the degree (for exception, see "Master's Thesis," below).

Candidates for the degree in a selected field of specialization must complet a minimum of 12 of the required 24 semester hours in courses and writte projects related to the selected field. Each Master of Laws program of stud may include a limited number of courses numbered in the 300 series, with th approval of the Dean.

MASTER'S THESIS

Each candidate for the degree of Master of Laws is expected to write a Ma ter's thesis (Law 599–600) under the supervision of a member of the faculty o the National Law Center. Four hours of credit will be granted for successful completion of the thesis. The purpose of this requirement is to demonstrate the ability of the student to perform research in a special area of the law and to produce a scholarly paper containing the results of this research. The thesis is expected to be of substantially the same quality as a Law Review article. The Dean may waive the thesis requirement upon written request of the student submitted no later than the beginning of the *final semester or summer session* before the student's graduation, provided the student has demonstrated his re search and writing ability by taking a minimum of 6 semester hours of course work designated "Research Paper."

The thesis in its final form must be presented to the Adviser no later than the date specified in the Calendar. Two complete copies are required. It is the responsibility of the candidate to obtain from the Office of the Post-J.D. degree programs a printed copy of the regulations governing the styling and reproduc tion of theses. The mandatory thesis binding fee of $10 must be paid at the time of registration for the last semester's work.

Accepted theses become the property of the University and are placed in the Law Library, where the duplicate copies are bound and made available for circulation.

HONORS

The degree of Master of Laws "With Highest Honors" is awarded students who obtain a minimum cumulative average of 85.

GRADUATE COURSES IN OTHER DEPARTMENTS

A Master of Laws candidate may be permitted to take graduate courses relate to his field of interest in other departments of this University. A maximum o 6 semester hours will be credited toward the degree for such courses; however credit will be granted only if the courses are given on campus. The grade of *CR* (Credit) or *NC* (No Credit) will be recorded for such courses. Course numbered 101–200 may be taken for graduate credit only if the student receive

the approval of the instructor at the time of registration and does additional work, as prescribed by the department offering the course.

CONSORTIUM OF UNIVERSITIES OF THE WASHINGTON METROPOLITAN AREA, INC.

A candidate for the Master of Laws degree may take graduate courses at Georgetown University Law Center through the Consortium of Universities of the Washington Metropolitan Area, Inc. A maximum of 6 semester hours of such courses may be credited toward the degree. Permission to take Consortium courses must be granted by the Dean, the Registrar, and the instructor offering the course. The grade of *CR* (Credit) or *NC* (No Credit) will be recorded for such courses.

DOCTOR OF JURIDICAL SCIENCE

ENTRANCE REQUIREMENTS

Admission to candidacy for the degree of Doctor of Juridical Science requires a Bachelor of Arts or equivalent degree from an approved college or university; a Bachelor of Laws, Juris Doctor, or equivalent degree, earned with high rank, from a law school which is a member of the Association of American Law Schools or is approved by the American Bar Association; in most instances a Master of Laws degree with high academic standing; outstanding capacity for scholarly work in the field of law; and faculty approval of the applicant's dissertation topic. The applicant must also demonstrate his writing ability by submitting his Master's thesis or a copy of one or more papers or articles which he has written. Following consultation with the Dean, the applicant must obtain a faculty adviser, to be designated "committee chairman," from the regular, full-time faculty; reach agreement on the acceptability of the proposed topic for the dissertation; and submit a detailed outline for his adviser's approval, indicating by chapter and division within chapter the exact scope of the project. There should be a bibliography for each chapter, listing books, reports, cases, and law review articles to be considered. Although the outline cannot predict every detail of the subsequent research, it must be sufficiently definite to afford the Graduate Board a basis for evaluation.



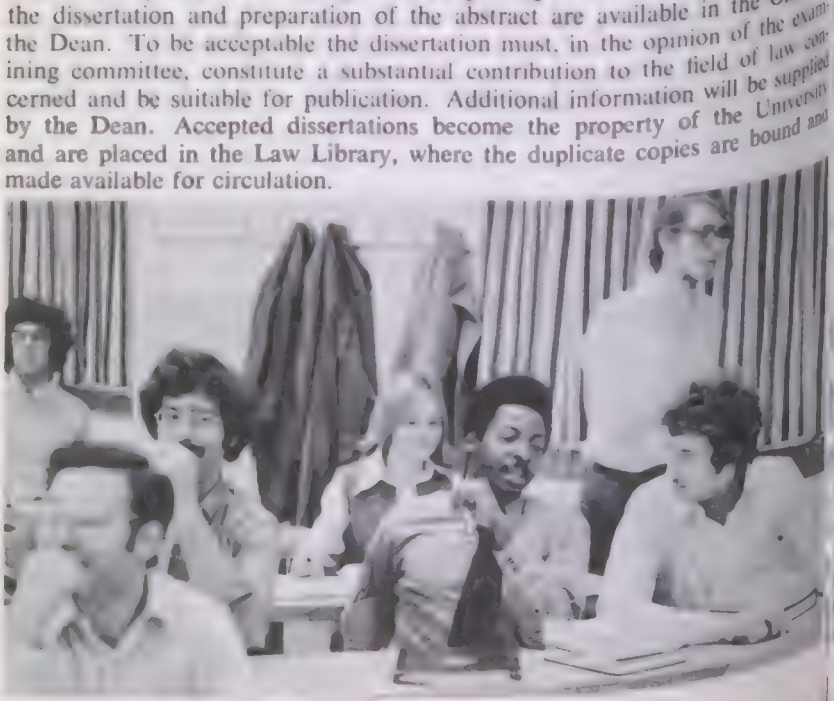
Once the outline is approved, the applicant's "committee" is expanded to three members; this consultative committee must recommend the acceptance of the applicant to the full Graduate Board. The Board then acts upon the recommendation and may either accept or reject the applicant as an S.J.D. candidate. In no instance will any applicant be admitted to degree candidacy prior to the above procedures; however, he may be registered as an Unclassified Student for purposes of course work requirements (see below).

DEGREE REQUIREMENTS

The candidate must complete (1) a residence period of not less than one academic year; (2) a course of study and research—designated by his consultative committee and approved by the Graduate Board—of no less than 8 semester hours including *Jurisprudence*, unless previously taken; and (3) an acceptable dissertation. The dissertation must be submitted no later than three years from the date of admission to candidacy for the S.J.D. degree. The applicant who proposes to write on a comparative law topic must have a reading knowledge of the language in which the relevant materials are to be found. When the dissertation is submitted, the consultative committee will set the date for an oral examination. This examination is conducted by the consultative committee and such other members of the faculty and qualified experts as are selected by the Graduate Board.

No later than the date specified in the Calendar (see page 5), the candidate must submit to the Dean two complete copies of the dissertation and two copies of an abstract (not to exceed 600 words) of his dissertation.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation and preparation of the abstract are available in the Office of the Dean. To be acceptable the dissertation must, in the opinion of the examining committee, constitute a substantial contribution to the field of law concerned and be suitable for publication. Additional information will be supplied by the Dean. Accepted dissertations become the property of the University and are placed in the Law Library, where the duplicate copies are bound and made available for circulation.



Degree Programs for Foreign Students

THE NATIONAL LAW CENTER has several programs of study available to students trained in law outside the United States. These programs fall into two general categories: (1) those directed toward preparing the student for a bar examination in an American jurisdiction and (2) those that enable the student to return to his country with a more thorough understanding of some aspects of American law.

A student with a degree from a foreign law school who has met the extremely competitive admissions criteria will be admitted to the Center as a candidate for the Master of Comparative Law (M.Comp.L.) or Master of Comparative Law (American Practice) (M.Comp.L. (Am.Prac.)) degree.

In order to prepare for admission to the bar of an American jurisdiction, the student may apply for either the Juris Doctor or the Master of Comparative Law (American Practice) degrees. The J.D. degree requires 84 semester hours of work in law school (credit is given for work in a foreign law school only in exceptional circumstances) and will qualify the student to take most U.S. bar examinations. The M.Comp.L. (Am.Prac.) degree requires 28 semester hours of work and satisfies the requirements of the District of Columbia Bar. *The student is cautioned to ascertain the requirements of the bar for which he intends to qualify prior to selection of his law school program.*

A student planning to return to his country may undertake a program leading to the degree of Master of Comparative Law. This degree program enables the student to gain a broader comprehension of the American legal system by taking basic courses in the Law Center.

ADMISSION PROCEDURE

Application must be received from *foreign applicants* no later than June 1 for the fall semester (April 1 for candidates for the Juris Doctor degree), October 15 for the spring semester, and March 1 for the summer sessions.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send directly to the Dean official credentials listing subjects studied, grades received, examinations taken, and degrees received. Original diplomas and certificates from secondary schools and all colleges and universities attended are required, but in exceptional cases certified copies will be accepted. Records of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

LANGUAGE TEST

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language* and attain as an absolute minimum the score of 550 in order to be admitted to the National Law Center. This is a mandatory requirement. Students are responsible for making arrangements for taking the test and should address inquiries to TOEFL, Educational Testing Service, Princeton, New Jersey 08540, U.S.A. The completed application form should

be returned to the Testing Service at Princeton well in advance of the beginnin of the semester for which the applicant seeks admission. The test fee, wh should be remitted with the application, entitles the student to have his te score sent to three different institutions. Registration for the *Test of English a Foreign Language* does *not* constitute application for admission to Georg Washington University.

The Bulletin of Information, obtainable without charge, contains a descrip tion of the test as well as rules regarding application, fees, reports, and th conduct of the test; lists of examination centers; examination dates; and a application blank. On the application for the test, the student should specif that the scores be sent to the Dean's Office.

ENTRANCE REQUIREMENTS

For the Degree of Juris Doctor.—Entrance requirements for foreign students are the same as those stated on page 11, except that advanced standing is rarel granted for study in foreign law schools.

For the Degrees of Master of Comparative Law and *Master of Comparative Law (American Practice).*—The entrance requirements are the successful com pletion of and graduation from a course in arts, philosophy, letters, or sciences equivalent to graduation from a gymnasium, lycee, or liceo; and graduation in law with high academic standing from a recognized foreign university.

For the Degree of Master of Laws.—Ordinarily a foreign student is admitted to one of the Master of Comparative Law degree programs, and only in un usual cases will an applicant be considered for the Master of Laws program i he or she does not have a graduate degree in law with high academic standing from an American university.

For the Degree of Doctor of Juridical Science.—The usual entrance re quirements are the successful completion of and graduation from a course in arts, philosophy, letters, or sciences, equivalent to graduation from a gymna sium, lycee, or liceo; graduation in law from a recognized foreign university outstanding capacity for scholarly work in the field of law; and a Master of Laws degree with high academic standing from an American university.

DEGREE REQUIREMENTS

Juris Doctor, Master of Laws, and *Doctor of Juridical Science.*—Degree requirements for foreign students are the same as those stated on pages 14–15, 19–20, and 22.

Master of Comparative Law.—The student must complete a residence period of not less than two semesters, which should be continuous. All requirements for the degree must be completed in a period not exceeding three years from the time of registration for the degree. The student must complete satisfac torily 24 semester hours of approved courses of the Center, or of such other departments of the University as the faculty of the Center shall approve, and must maintain a cumulative average of at least 55.

Master of Comparative Law (American Practice).—The requirements for this degree are the same as those for the degree of Master of Comparative Law except that this degree requires 28 semester hours of course work with a cumu lative average of at least 65.

Unclassified Students

TWO TYPES OF STUDENTS may be admitted to the National Law Center as Unclassified Students, in accordance with the following regulations:

1. A candidate for a Bachelor of Laws or Juris Doctor degree with an above-average record at another law school which is a member of the Association of American Law Schools or is approved by the American Bar Association, may at the discretion of the Dean, be admitted as an Unclassified Student to earn credits for transfer to the other law schools. Such students are normally admitted only to the summer sessions. They are admitted to the fall or spring semester only in unusual circumstances.

2. Graduates of law schools which are members of the Association of American Law Schools or are approved by the American Bar Association who wish to take advanced courses without pursuing degree programs may be admitted as Unclassified Students.

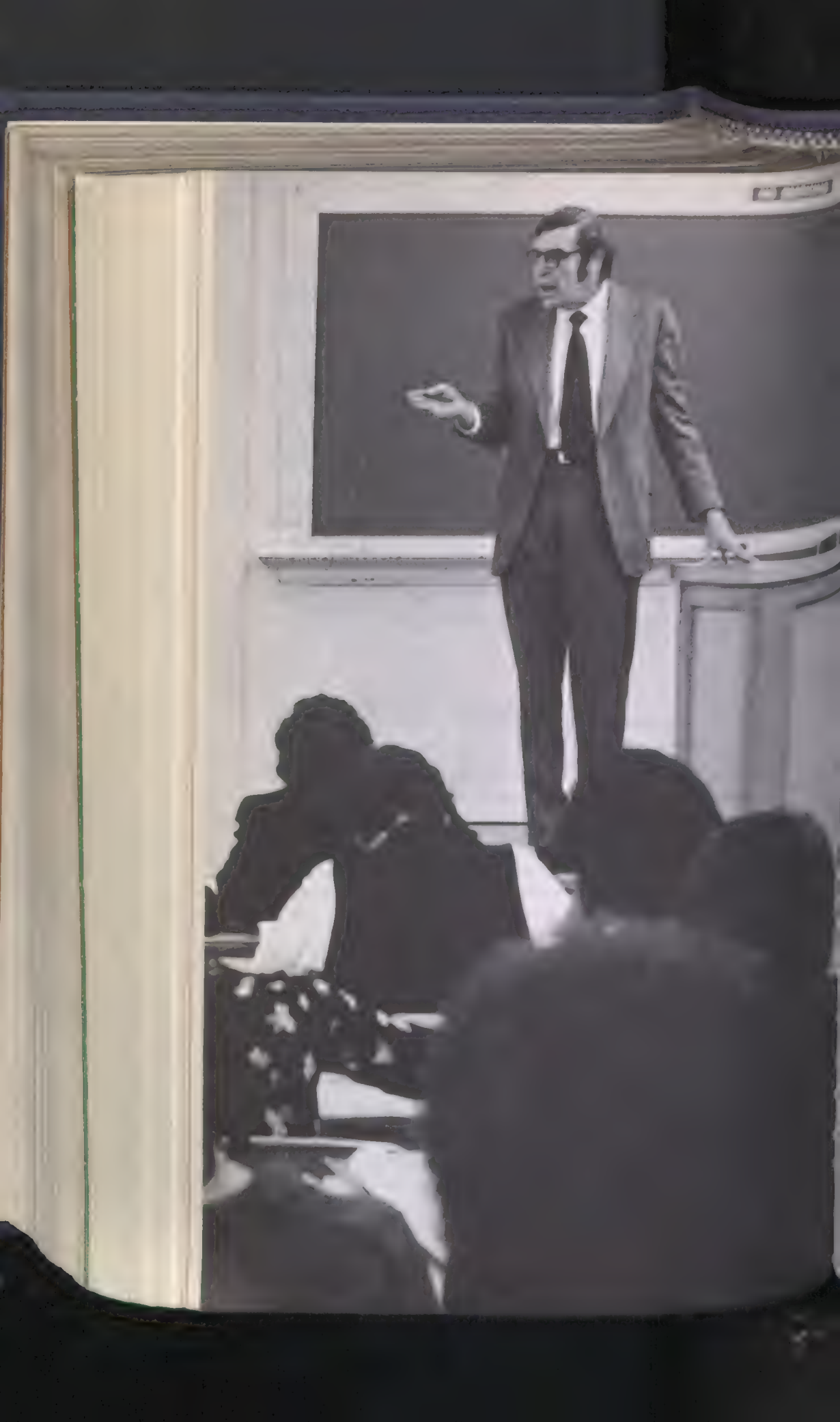
Unclassified Students participate in the work of the course, take examinations, and have their grades recorded. Credit for work earned as an Unclassified Student may not be applied to satisfy the requirements for a degree program unless expressly approved by the Dean.

Continuing Legal Education

MEMBERS OF THE BAR wishing to keep abreast of current developments in the law may register for any of the courses in the National Law Center on a non-credit basis as Continuing Legal Education students. Such students do not take examinations in courses and no grades are recorded for their work.

A simplified admission and registration procedure is used and must be completed on or before the last day of regular registration for the appropriate semester. Continuing Legal Education students pay only the tuition fee on the semester-hour basis. They may not participate in student activities or benefit from the medical privileges of the University. (Continuing Legal Education registrations are subject to cancellation if courses are filled by regularly registered students.)





GENERAL INFORMATION

THE NATIONAL LAW CENTER has an enrollment of seventeen hundred students for the J.D. and Post-J.D. degree programs. Approximately one thousand students are enrolled in the full-time day division for the J.D. degree and four hundred are enrolled in the part-time evening division. Three hundred students, many from abroad, are enrolled in the Post-J.D. degree programs.

DAY AND EVENING CLASSES

Day classes meet in the mornings in fifty-minute periods and in the afternoons in fifty-minute periods and also in sessions of two fifty-minute periods, Monday through Friday. Trial Practice Court and certain other courses meet for two-hour periods on Saturday mornings.

Evening classes meet from 5:50 to 7:40 p.m., Monday through Friday. A four-credit course, e.g., Evidence, meets two evenings a week; a three-credit course, e.g., Administrative Law, meets two evenings a week for one-half the semester and one evening for the other half; a two-credit course, e.g., Contracts II, meets one evening a week. The evening division conforms to the standards of the day division, the full-time faculty participating in the instruction.

Examinations for both day and evening classes may be given in the afternoon only. Examinations for day students may be given in the evening only.

SUMMER TERM

A term of two sessions, with day and evening classes, is offered in the summer. Students may register for either or both sessions. *No beginning students are admitted to the Juris Doctor program in the summer term.*

The summer term is shorter than a semester of the academic year, and, as a consequence, a student must attend two and one-half summer terms to receive residence credit for one academic year or attend one and one-half summer terms to receive residence credit for a semester.

A maximum of 6 semester hours may be taken each session by day students. Day students receive four-tenths of a semester of residence credit for each session of the summer term in which they are registered for 3 or more semester hours. A maximum of 4 semester hours may be taken each session by evening students. Evening students receive three-tenths of a semester of residence credit for each session of the summer term in which they are registered for 2 or more semester hours.

Admission

APPLICANTS ARE URGED to submit application forms and complete credentials well in advance of the semester for which they seek admission. In the selection process, there is no discrimination because of sex, race, color, or national origin. Two recent signed photographs and an application fee of $25 for a degree candidate, $5 for an Unclassified Student, must accompany the application.

Forms for application for admission or readmission are available at and should be returned to the Office of the Dean of the National Law Center, George Washington University, Washington, D.C. 20006.

For further details concerning students from foreign institutions, see pages 23–24.

APPLICATION FOR ADMISSION

Juris Doctor Program.—Beginning students are admitted only at the start of the fall semester.

The applicant should register with the Law School Data Assembly Service (LSDAS) by completing and mailing the registration form supplied with each application blank. A transcript from each college or university attended should then be sent directly to LSDAS, Educational Testing Service, Box 944, Princeton, New Jersey 08540. No transcript should be sent to the National Law Center. The LSDAS will analyze the transcript and send a copy to this law school and others designated on the registration form. If the transcript which has been forwarded to LSDAS does not show evidence of receipt of a Bachelor's degree, the applicant will be asked, upon acceptance, to submit a final transcript directly to the National Law Center.

To provide time for the evaluation of credentials of beginning students, all papers, including the Law School Admission Test score, should be received by the National Law Center before March 1. This means that the October or December Law School Admission Test should be taken (see "Entrance Requirements," pages 14–15).

All papers of transfer students should be received by the Office of the Dean no later than May 1 for the fall semester, December 1 for the spring semester, and one month prior to registration for the summer session for which application is made.

For additional information, see the official *Pre-Law Handbook*, 1974–75 edition, available in October, 1974, and prepared by the Law School Admission Council and the Association of American Law Schools. This book includes material on the law and lawyers, pre-law preparation, applying to law schools, and the study of law, together with individualized information on most American law schools. It may be obtained at college bookstores or ordered from Educational Testing Service, Princeton, New Jersey 08540.

Master's and Doctoral Programs.—Students are admitted at the beginning of the fall semester, the spring semester, or any of the summer sessions.

Application for admission, together with all required credentials, must be received by July 1 for the fall semester, December 1 for the spring semester, and one month prior to registration for the summer session for which application is made.

Unclassified Students.—Lawyers who wish to take graduate courses are admitted at the beginning of the fall semester, the spring semester, or any of

the summer sessions. Students who wish to earn credits for transfer toward a Bachelor of Laws or Juris Doctor degree at another institution may be admitted to the summer sessions if they are students in good standing at an accredited law school and have shown unusual ability in their law studies; they are admitted to the fall or spring semester only in unusual circumstances.

1. Application for admission, with required credentials, for a student who wishes to earn credits for transfer toward a Bachelor of Laws or Juris Doctor degree at another law school (see page 25), should be received at the Office of the Dean at least one month prior to the first day of registration for the semester or summer session for which application is made.

2. Application for admission, with required credentials, for lawyers who wish to take graduate courses (see page 25), should be received at the Office of the Dean by July 1 for the fall semester, December 1 for the spring semester, and one month prior to registration for the summer session for which application is made.

READMISSION

A student who was previously registered but did not attend during the most recent semester (summer term excluded) should file an application for readmission. Closing dates for readmission are the same as those for admission (see "Application for Admission," pages 28–29).

If the student has attended one or more higher institutions during his absence from the University or if he applies as a degree candidate and was previously a nondegree student, he must have complete, official transcripts sent to the Dean.

Registration

BEFORE ATTENDING CLASSES each student must present himself in person for registration. No student will be registered until proper credentials have been filed and approved (see "Admission").

No registration is accepted for less than a semester or one summer session.

A student may not register concurrently in George Washington University and another institution. Registration in more than one college, school, or division of the University requires the written permission of the deans concerned, *prior to registration.*

ELIGIBILITY FOR REGISTRATION

A student who is suspended or whose record is not clear for any reason is not eligible to register.

New Student.—Upon receipt of a *final letter* of admission a new student is eligible for registration on the stated days of registration.

Readmitted Student.—A student previously registered who was not registered for courses during the preceding semester or summer session must apply for and receive a letter of readmission (see "Readmission," above) before he is eligible for registration.

TIME AND PLACE OF REGISTRATION

Registration is held in Stockton Hall, 720 Twentieth Street, N.W., during the following periods: *fall semester,* August 22 and 23, *spring semester,* January 13 and 14.

A late-registration fee of $15 is charged each student who is permitted to register after the regular registration days.

Registration may be changed only with the permission of the Dean.



Fees and Financial Regulations

THE FOLLOWING FEES AND FINANCIAL REGULATIONS were adopted for the academic year 1974–75. (See page 32 for projected tuition and fee increases for 1975–78.)

Tuition Fees

All law students except candidates for the degree of Doctor of Juridical Science:	
Full-time program (11 to 15 hours*), each semester	$1,212.50
Part-time program or hours in excess of 15 for all candidates for the degree for Juris Doctor, for each semester hour	90.00
Part-time program for students other than candidates for the degree of Juris Doctor, for each semester hour	92.00
Doctor of Juridical Science,† including the final examination	2,525.00

University Center Fee (nonrefundable)

For students registered for 11 or more semester hours:	
Each semester	43.00
For students registered for less than 11 semester hours in a semester:	
For each semester hour for which the student registers	4.00
For students maintaining "continuous registration" status:	
Each semester	4.00

Graduation Fees

Juris Doctor, Master's, Doctor's degrees	25.00
Fee for binding Master's Thesis	10.00

Residence Hall Fees (See page 46)

Special Fees

Application fee (degree candidate), nonrefundable	25.00
Application fee (unclassified student), nonrefundable	5.00
Application fee for room reservation, nonrefundable	100.00
Tuition deposit fee, nonrefundable, charged each student admitted to J.D. degree candidacy (payable in two installments—$100 by a date specified in the letter of admission, $350 by June 1)	450.00
Late-registration fee, for failure to register within the designated period	15.00
Continuous Registration fee, for post-J.D. students, to maintain "continuous registration" during any semester of absence from the University or after completion of tuition requirements.‡ Due and payable on the official days of registration	92.00
Late-payment fee, charged for failure to make payments when due (see "Payment of Fees," pages 32–33)	15.00

* With the prior permission of the Dean, a J.D. degree candidate may take more than 14 semester hours after his first year of study. *Any student* taking in excess of 15 hours a semester must pay the hourly rate for each semester hour in excess of 15, in addition to the full-time program fee of $1,212.50.

† The tuition fee is to be paid at the rate of $631.25 a semester for four successive semesters, exclusive of the summer term or terms. No "continuous registration" fee will be charged if a third year is needed for completion of the degree requirements. If the Faculty should approve an extension of time, the student must maintain continuous registration and pay the continuous registration fee.

‡ The continuous registration fee applies toward neither financial nor residence requirements for the degree. This fee does not apply to students granted military leave (see page 43).

Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 32–33)	$35.00
Returned check fee, charged a student whose check is returned because of insufficient funds or improper drafting	15.00
Transcript fee, for each transcript of record	2.00

Registration on campus in the University entitles each student to the following University privileges: the services of the Student Career Services Office; the use of the University Library; gymnasium privileges; admission to all athletic contests, unless otherwise specified; subscription to the *University Hatchet*, the student newspaper; admission to University debates; medical attention as described under Student Health Service. These privileges terminate and a student is no longer in residence when he withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES 1975–78

In order that students and their parents may plan more realistically, tuition increases for the academic years 1975–76, 1976–77, and 1977–78 have been estimated as follows:

*Increase by year (full-time students):	
1975–76	$75.00
1976–77	100.00
1977–78	200.00
Increase by semester hour (part-time students):	
1975–76	4.00
1976–77	4.00
1977–78	7.00

The University Center Fee will be increased for the 1975 summer sessions and the academic year 1975–76. For students taking 11 or more semester hours, the fee will be $46.50 a semester, an increase of $3.50. Students taking less than 11 semester hours will pay $4.35 a semester hour, an increase of $.35.

Every effort will be made to keep tuition increases within the above limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment in these estimates.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made out to George Washington University with student identification number shown in upper left hand corner.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance at the time of registration and the remaining half on or before

* These yearly increases are also projected for the total fee for work leading to the degree of Doctor of Juridical Science.

October 23, 1974 (for the fall semester), and March 5, 1975 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $525 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his right to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

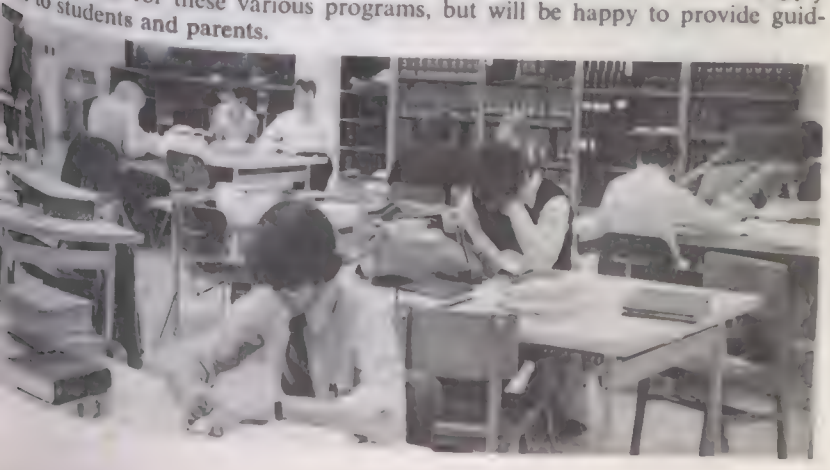
Students auditing courses are subject to all fees charged to students registered for credit.

PREPAID AND DEFERRED PAYMENT PLANS FOR PARENTS

Several commercial programs for parents who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.



WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the Dean. Withdrawal from courses is permitted after the midpoint of a semester only in extraordinary circumstances. Notification to an instructor is not an acceptable notice.

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

1. *Complete withdrawal* from the University:

FALL SEMESTER

Withdrawal dated on or before August 30, 1974	90 per cent
Withdrawal dated September 2 to September 13, 1974	75 per cent
Withdrawal dated September 16 to September 27, 1974	50 per cent
Withdrawal dated after September 27, 1974	none

SPRING SEMESTER

Withdrawal dated on or before January 24, 1975	90 per cent
Withdrawal dated January 27 to February 7, 1975	75 per cent
Withdrawal dated February 10 to February 21, 1975	50 per cent
Withdrawal dated after February 21, 1975	none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal by a part-time student*, the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in a full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for complete withdrawal from the University (see No. 1, above). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 43).
5. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be refunded or reduced because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred and will not be credited to another semester (exception: students granted military leave, see page 43).

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

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* Regulations covering withdrawal and refunds for the summer session are stated in the *Summer Sessions Catalogue*.

Financial Aid

THE NATIONAL LAW CENTER has been able in recent years to assist many students in obtaining the financial aid they require, through full or partial scholarships, various loan programs, part-time employment, or a combination of these kinds of assistance.

GRADUATE AND PROFESSIONAL SCHOOL FINANCIAL AID SERVICE

The National Law Center participates in the Graduate and Professional School Financial Aid Service (GAPSFAS), which provides an analysis of an applicant's financial needs. Entering students wishing to receive financial aid should request the materials from GAPSFAS, Education Testing Service, Box 944, Princeton, New Jersey 08540. The information provided by the applicant and his parents will be analyzed, and a copy of the report will be sent to the Law Center. In addition, students entering the National Law Center who desire to be considered for a scholarship must submit a letter to the Law Center by March 1 outlining their academic qualifications, their extracurricular activities, and their reasons for believing a scholarship award to them is justified.

Students needing financial assistance should file with GAPSFAS in time for their reports to be received at the Law Center as early as possible since the Committee on Student Financial Aid of the Center will begin making awards in March, and available funds are limited.

No awards will be made to an entering student until his admission has been finalized.

JURIS DOCTOR PROGRAM

SCHOLARSHIPS AND RESEARCH ASSISTANTSHIPS

Application and correspondence concerning scholarships and research assistantships should be sent directly to the Dean. Unless otherwise specified, application and supporting credentials should be submitted no later than March 1 preceding the period for which the award is made.

Arent, Fox, Kintner, Plotkin & Kahn Scholarship (1973).—Scholarship aid for needy law students from the Washington, D.C., area.

Mildred Gott Bryan Scholarship Fund (1965).—Partial scholarship aid for students in the National Law Center.

Charles Worthington Dorsey Memorial Scholarship (1947).—Memorial to Charles Worthington Dorsey, LL.B. 1881, LL.M. 1882. A full-tuition scholarship for the course leading to the degree of Juris Doctor, awarded to a needy and promising graduate of this University with a Bachelor of Arts or equivalent degree. Ordinarily this scholarship is awarded once every three years.

Honor Scholarships.—Two scholarships available each year to students entering upon full-time study. Each scholarship provides a cash award for the first year, in addition to tuition aid, in an amount depending on need, for all three years. These scholarships are awarded on the basis of outstanding college records, both academic and extracurricular; Law School Admission Test scores; and need. To retain the scholarship for the second and third years, the candidates must maintain a *B* average, both for each year and cumulative.

Law Center Tuition Remission.—For students from minority groups, based on financial need.

Phi Delta Delta Scholarships (1959).—Zeta Chapter of Phi Delta Delta Legal Fraternity (International), provides tuition aid to a woman student in the second year of the Juris Doctor program who excelled in scholastic achievement and service to the Center in her first year.

Research Assistantships.—Available each year to students currently enrolled. Each assistant receives an annual stipend. Awards are made on the basis of academic standing, financial need, capacity for leadership, and research and writing potential. Applications should be submitted no later than July 1.

Research Scholarships.—Available each year to students currently enrolled, preferably to applicants who are completing the second year. Scholarship awards are made on the basis of academic standing, financial need, capacity for leadership, and research and writing potential. Applications should be submitted no later than June 1.

Trustee Scholarships.—Scholarships awarded each year to entering students for tuition aid, in an amount depending on need, in the morning division. Candidates must have demonstrated qualities of leadership in addition to scholastic attainment. To retain the scholarship, the successful candidate must maintain a *B* average, both for each year and cumulative. Application must be made to the Dean before March 1.

Tuition-aid scholarships are also available to continuing second- and third-year full-time students with demonstrated scholastic ability, on the basis of financial need and capacity for leadership. Application should be made to the Dean prior to June 1.



Frank S. Whitcomb Scholarship Fund (1971).—Bequest of Frank S. Whitcomb for the purpose of aiding and assisting worthy young men and women in securing a legal education.

LOAN FUNDS

Through the generosity of friends of the University a number of loan funds are available. Among them are the Robert Ash Loan Fund; the George R. Beneman Loan Fund; the Morris and Gwendolyn Cafritz Foundation Minority Law Student Loan Fund; the Robert M. and Mary McConnel Cooper Loan Fund; the Robert McKinney Cooper Memorial Loan Fund; the District of Columbia Bar Association Loan Fund; the J.W. Ehrlich Foundation Loan Fund; the Harold L. and Violet George Foundation Loan Fund; the George Washington Law Association Loan Fund; the Jephson Educational Trust Loan Fund; the Law Association Loan Fund for the law classes of 1912, 1918, 1921, 1924, 1929, 1931, 1933, 1935, 1936, 1937, 1938, 1939, 1941, 1942, 1945, 1950, 1951, 1952, 1953, 1955, 1959, 1960, 1961, 1962, 1963, 1964, 1965; the Oscar Lawler Memorial Loan Fund; the Horace L. Lohnes Memorial Assistance Fund; the Jessie B. Martin Loan Fund; the Mike Pelekiri Loan Fund; the W. Theodore Pierson Loan Fund; and the Orville Hassler Walburn Memorial Loan Fund.

In addition, financial assistance is available through the Guaranteed Student Loan Program, National Defense Education Act loans, the American Bar Association Loan Program, and other sources.

Application for financial assistance should be made in the Office of the Dean.

MASTER'S AND DOCTORAL PROGRAMS

SCHOLARSHIPS, FELLOWSHIPS, AND RESEARCH OPPORTUNITIES

Application should be made before March 1 preceding the period for which the award is made. The applicant should submit an application for admission as a degree candidate and a personal letter applying for a fellowship to the Dean. The letter of application should contain complete biographical data, information as to experience in practice or teaching and his military status, copies of or citations to his published legal writings, and such other information as he believes will be of assistance in the consideration of his application. He should arrange for letters of recommendation to be sent from two members of his law faculty directly to the Dean. His academic rank in law should be included either in the transcript of his law school record or in the letters of recommendation.

Richard Paul Momsen Scholarships for Brazilian Graduate Law Students.—Bequest of Richard Paul Momsen, LL.B. 1912. Awarded 1974–75 and alternate years, for the study of U.S. constitutional law and the law of patents and trademarks.

Teaching Fellowships.—Two fellowships available each year with a stipend of $7,000 plus tuition for an approved course of study leading to an advanced degree. Teaching fellowships are awarded for a term of two academic years. Fellows conduct the first-year course in Legal Research and Writing and work with the students to improve their legal writing ability. By arrangement with the Dean, they are also given the opportunity to teach additional courses.

Research Study Opportunities.—Research assistantships providing opportunity for graduate study with the program of Law, Science, and Technology.

Prizes

Jacob Burns Prize.—Established by Jacob Burns, a law alumnus and Trustee of the University. A medal and $100 awarded annually to each of the two members of the winning team in the upperclass Van Vleck Moot Court competition.

Ogden W. Fields Graduate Prize.—Fifty dollars awarded annually to the graduate student who has demonstrated the highest overall proficiency in a course in labor law.

Charles Glover Prize.—Established by Charles Carroll Glover, Jr., an Honorary Trustee of the University, in memory of his great-grandfather, an illustrious member of the bar of the District of Columbia. Consists of selected law books. Awarded annually to the student who has attained the highest average grade in the third-year, full-time course.

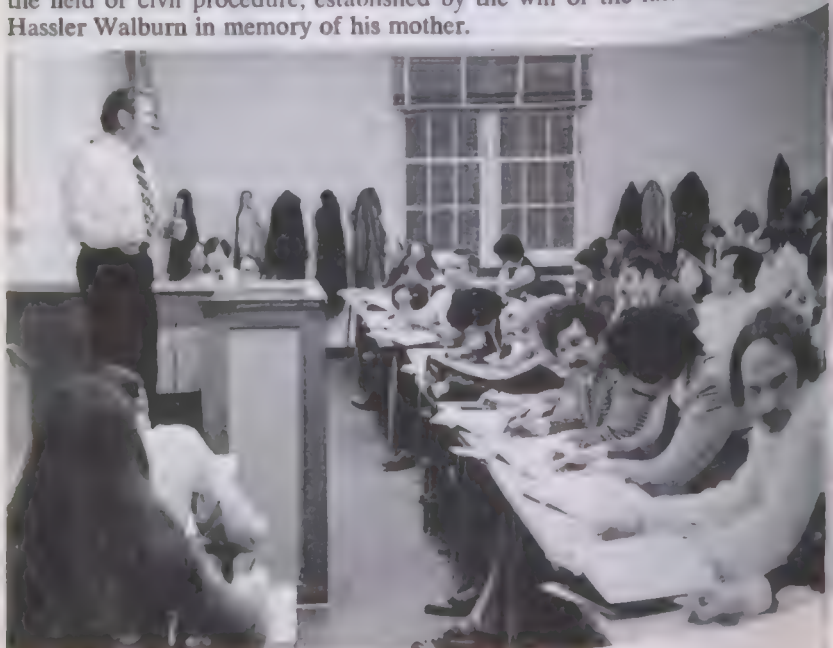
Kappa Beta Pi Prize.—Awarded by Eta Alumnae Chapter to the woman law student who attains the highest average for the first year.

John Bell Larner Prize.—By bequest, a medal awarded annually to the member of the graduating class who attains the highest average grade in the entire course for the degree of Juris Doctor.

John Ordronaux Prizes.—By bequest, $75 awarded annually to the student who has attained the highest average grade in the first-year full-time course, and $75 to the student who has attained the highest cumulative average grade at the end of the second-year, full-time course.

United States Law Week Award.—Presented to an outstanding senior law student.

Jennie Hassler Walburn Prize.—A cash reward to the outstanding student in the field of civil procedure, established by the will of the late Professor Orville Hassler Walburn in memory of his mother.



ACADEMIC WORK LOAD

Juris Doctor Candidates.—Juris Doctor candidates without substantial outside employment may take a program of studies of 14 hours a week. Such students may take courses in the evening only if they are not scheduled in the daytime and if a majority of the hours taken are in day courses. The Dean is authorized to approve programs of study of more than 14 hours in exceptional cases; however, no program will be approved which would permit the student to complete requirements for the degree in less than 28 months after he begins his first year of law study. Students with 20 hours or more of outside employment, whether in the day or evening division, must take a limited program of studies not exceeding 10 hours a week. Students taking a majority of their classes in the evening may not take more than 10 hours a week; the minimum load is 8 hours, except in special cases where 6 may be approved by the Dean for a limited time. A minimum schedule of 11 hours in the day division is required except in exceptional circumstances when a reduced program is authorized by the Dean.

Students taking more than 8 hours in the day division or 4 hours in the evening division must have the permission of the Dean to take a Bar Review course.

Students may transfer from the day division to the evening division only with the permission of the Dean.

With the approval of the Dean, second- and third-year students may take a maximum of 6 semester hours of appropriate courses in other departments of the University; such a student must receive a grade of at least *B* to obtain credit for such courses, and in no event will the grade count in computing his cumulative average.

Master's Candidates.—Master's candidates without substantial outside employment may take a maximum of 12 hours a week. Students with 20 hours or more of outside employment must take a limited program of study not to exceed 8 hours a week. The minimum load is 4 hours unless approval for fewer hours is given by the Dean for a limited time.

ATTENDANCE

Regular attendance at classes is required and is necessary for successful work. A student who is deficient in class attendance in any course may be barred from taking the examination.

CHANGES IN PROGRAM OF STUDIES

A student may not add courses or change from one section to another of the same course without the approval of the Dean. Students may drop courses only with the written approval of the Dean. In addition, approval of the instructor is ordinarily required unless the request is made early in the semester. Under no circumstances may any student drop a course after the last day before regularly scheduled examinations begin in any semester or summer session.

RESEARCH PAPER IN LIEU OF EXAMINATION

The preparation of a research paper is required in lieu of an examination in seminars and in other courses, as indicated in the course descriptions. Any research paper must be submitted by the first day of the examination period (the first day any examination is given in any course). For sufficient reason, the instructor may extend the time beyond this date to a later date, subject to the following conditions: (1) no student will receive any credit for the course for any purpose until a paper acceptable to the instructor has been submitted; (2) if a paper is submitted after the last day of examinations (or the last day before registration for the spring semester), the only grade the student may receive for the course is *CR* (Credit) or *NC* (No Credit), except that failure ultimately to submit any paper for the course will result in a grade of 45. Students who are candidates for the J.D. degree may register for one such course in each semester of their third year; with the approval of the Dean such students may register for more than one such course each semester. Approval of the Dean is required for second-year students to take such courses.

EXAMINATIONS

Written examinations are held at the end of most courses. Every student is required to take the regular examinations unless excused. No excuse for absence will be granted except by the Dean and then only for illness or other emergency. Application for excuse must be made in writing not later than one month after the date of the examination. A student excused from a final examination will be permitted to apply to the instructor for a Credit/No Credit determination. The instructor will select the mode of determination (for example, a make-up examination or paper). The student will have the option of (1) complying with the instructor's procedure of determining Credit/No Credit, or (2) having the grade *I* (Incomplete) entered on his record and taking the next regularly scheduled examination for a numerical grade. The examination may not be taken after exclusion for low scholarship.

Permission to take an examination before the regularly scheduled date will not be granted. Permission to take a postponed examination is limited to the situations provided for in the preceding paragraph.

A student who has been excused from taking a regular examination and who is a candidate for a degree to be conferred prior to the next regular examination in the subject may petition the Scholarship Committee, which may authorize such action as the circumstances require.

If a student fails to take an examination, a grade of 45 will be recorded unless he has been excused from the examination as provided above or has obtained the Dean's permission to drop the course.

CREDIT/NO CREDIT OPTION

Candidates for the degree of Juris Doctor may take, in addition to courses regularly given on a "Credit/No Credit" basis, 12 semester hours of elective course work on a "Credit/No Credit" basis, and will receive a grade of "Credit" if the course is satisfactorily completed with a grade of 65 or better. No student may change from a numerical grade to a "Credit/No Credit" basis in a course during the last four weeks of classes except with the permission of the instructor. An unexcused failure to take an examination in a course or failure

to submit a required research paper will result in the recording of a grade of 45 for a course taken on a "Credit/No Credit" basis.

No student may take more than 17 semester hours of courses (including Law 220 and also courses regularly given on a "Credit No Credit" basis) on a "Credit-No Credit" basis.

Students are advised to consider carefully the advisability of electing to take courses on a "Credit No Credit" basis. In the opinion of the faculty, a student's election to take courses on a "Credit No Credit" basis may, in view of the importance apparently attached to grades by educational institutions and employees, be detrimental to the student's career in the legal profession.

GRADES

Grades are given in numerical terms equivalent to letter grades as follows: 85–100, *A*, Excellent; 75–84, *B*, Good; 65–74, *C*, Satisfactory; 55–64, *D*, Poor —below standard for graduation; 45 54, *F*, Failure. In courses Law 220, 321–22, 323, 342, 343, 345, 346, 385, 399, 459, 479, 487, 509, 579, and 593 grades are *CR*, Credit; *NC*, No Credit. A student who has been excused from failure to take a regularly scheduled examination is given the grade of *I*, Incomplete. See "Examinations" (page 40) for grade upon failure to take an examination. Grades between 55 and 100 indicate that the work has been completed and credit given. Grades between 55 and 64, however, do not represent satisfactory work and adversely affect a student's cumulative average. No credit is given for grades below 55.

Any student who receives a grade below 55 (*F*) has the right to retake the course once, from the same or a different instructor, but only within the next academic year. The grade received in the retaken course shall be entered into the student's record in addition to the original grade, and both grades shall be included in computing the student's average. A student may exercise his right to retake a course only with respect to two different courses during his Law Center studies.

The cumulative average of a student includes all grades in all courses taken while he is a candidate for a particular degree. When a course is repeated (see "Academic Dishonesty," page 43), both the first grade and the susequent grade or grades are counted in the cumulative average.

EXCLUSION AND PROBATION FOR POOR SCHOLARSHIP

Candidates for the Degree of Juris Doctor.—A student whose cumulative average at the end of any semester falls below 65.0 but is above 64.0 will be notified that he is on probation. If such a student fails to raise his cumulative average to 65.0 at the end of the next semester, he will not be permitted to register for any succeeding semester unless he petitions for and receives the permission of the Scholarship Committee.

A student whose cumulative average at the end of any semester falls below 64.0 will not be permitted to register for any succeeding semester unless he petitions for and receives the permission of the Scholarship Committee to register.

A student who fails more than one course over his entire period of law study will not be permitted to register for any succeeding semester or to graduate unless he petitions for and receives the permission of the Scholarship Committee.

A student who is not permitted to register under the foregoing provisions

will be excluded as of the beginning of the semester for which he was ineligible to register.

Students who are registered at the time they receive notice that they will not be permitted to register for the next semester are entitled to withdraw from school and to receive a full refund of the tuition paid for the semester, or to complete the work for which they are registered.

Any student excluded may petition for reinstatement; if he can demonstrate that his low grades were due to circumstances beyond his control and that he has the capacity to pursue the study of law with a definite likelihood of success, he may be readmitted subject to such conditions as may be imposed by the Scholarship Committee.

Despite the above provisions, a student will be allowed to complete his first two semesters of law study before he is denied permission to register for a succeeding semester.

The term "semester" includes a session of the summer term.

Candidates for Masters' and Doctoral Degrees.—A candidate for a Master's or doctoral degree whose work is not satisfactory in the opinion of the faculty, taking into consideration the requirements and standards for the degree, may, by action of the faculty, be excluded at the end of the semester for which he is currently registered.

A cumulative average of 75 is required for the Master of Laws degree. A student whose cumulative average falls below 75 at anytime will be ineligible for continuation in the program without the permission of the Dean. He will not be permitted to register for any succeeding semester unless he petitions for and receives the permission of the Dean or the Board for Graduate Studies.

Unclassified Students.—An unclassified student whose work is not satisfactory may be excluded at the end of the semester for which he is currently registered.

SUMMER SCHOOL CREDIT

Students planning to attend summer school sessions at other law schools and desiring to use credits obtained at such schools in their Juris Doctor program at this Center must first have the courses they wish to take approved by the Dean. In no event will credits be given for unsatisfactory work or be recognized in excess of those which might be obtained in a similar period in this program.

TRANSCRIPTS OF RECORD

Official transcripts of student records will be issued on request of the student or former student. A fee of two dollars is charged for each transcript. No transcript will be issued for a person who does not have a clear financial record.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until all degree requirements are satisfied. By failing to register for one semester or more, the student breaks his registration and must be readmitted (see "Readmission," page 29). A "Readmitted Student" is required to satisfy the curriculum requirements existing at the time of his readmission. Post-J.D. students

who have completed course registration may maintain continuous registration by paying the "continuous registration" fee (see page 31); *J.D. degree candidates may not maintain continuous registration by paying the "continuous registration" fee.*

GRADUATION REQUIREMENTS

Diplomas are awarded at a February Convocation, at a May Commencement, and in September.

To be recommended by the Faculty for graduation, a student must have met the admission requirements of the National Law Center; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which he is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session immediately preceding the awarding of the degree.

Application for Graduation.—An "Application for Graduation" form must be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer sessions.

ACADEMIC DISHONESTY

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the Dean's Council, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the Dean's Council, the disciplinary grade of "Failure—Academic dishonesty" will be recorded for the course involved, and this grade will be employed in the computation of the cumulative average. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to his Dean of a copy of his orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, he must apply for readmission to the University well in advance of the semester in which he expects to return. Payments for tuition and fees which are not refunded to the student at the time he is granted military leave will be maintained as a deferred credit for his account and use upon return to the University.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible

enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled, dates of attendance; verification of date and place of birth; degrees earned, if any, date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1 above.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO DISMISS STUDENTS

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, his registration may be canceled and he will be ineligible (except by special action of the Faculty) for subsequent registration.

The right is reserved by the University to dismiss or exclude any student from the University or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable to do so.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property in any University building. A "Lost and Found" Office is maintained in the Campus Security Office.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 101–3) contains regulations recently approved by the University's Board of Trustees.

University Computer Center

THE UNIVERSITY COMPUTER CENTER is located on the first floor of Stuart Hall, 2013 G Street, N.W. The facilities of the Center are available for academic purposes to all registered students and to members of the instructional staff. The Center has as its principal mission the provision of a powerful computing system which serves the University in its educational and research endeavors. The Center's programming staff concentrates its efforts in conducting faculty and staff seminars, consulting with users in the preparation of complicated programs, and carrying out computer-oriented research.

The Computer Center equipment consists of an IBM system 370 model 145 computer with large capacity on-line disk storage, a card read/punch, a high-speed line printer, and four tape drives. The principal languages available to the user are FORTRAN IV, COBOL, Programming Language One (PL/1), Assembler Language, and ALGOL. In addition, numerous utility, statistical, data manipulation, and simulation systems and special languages are available in the library of programs. Facilities are available on a first-come, first-served basis for preparation of programs and data.

Computer programming courses are offered by the School of Government and Business Administration, the Department of Statistics, and the School of Engineering and Applied Science. In addition, many other departments offer courses that utilize the computer as a research adjunct to course work.

The Computer Center is normally open 24 hours a day, seven days a week.



Student Services

RESIDENCE HALLS

COMPLETE INFORMATION concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20006. Information concerning off-campus housing near the University may be obtained at this Office. The reservation of rooms in private houses must be made by students.

Admission to the University does not include a room reservation. Information concerning housing may be obtained by writing directly to the Director of Housing, George Washington University, Washington, D.C. 20006.

1974–75 RESIDENCE HALL RATES PER PERSON FOR TWO SEMESTERS*

Madison Hall, double room, $875 per student; Graduate Hall, apartment for two or three (apartments in this hall have kitchen facilities), $925 per student.

FOOD SERVICE*

Food service is available from August 29 through December 18, 1974, and from January 9 through May 3, 1975, with vacation periods and holidays excluded. The rate for the seven-day, 20 meals per week plan is $720 for the academic year; the rate for the five-day, 15 meals per week (Monday through Friday) plan is $690 for the academic year. The well-balanced meals are served cafeteria-style.

MUNSON HALL APARTMENTS

Munson Hall is a University-owned and operated apartment house containing 15 one-bedroom and 54 efficiency apartments. Graduate and married students are given priority for residence until July 15 each year. All leases are for one 12-month year.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

A two-board structure, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. The Governing Board and the Operations Board work closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

STUDENT HEALTH SERVICE

The Student Health Service is a general outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

* Residence hall and food service prices subject to change.

Physicians are present during the academic year from 9 a.m. to 5 p.m. and from 6 p.m. to 10 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. This schedule is also maintained during the Summer Sessions, except that the evening closing hour Monday through Friday is 9 p.m.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed his connection with the University is ineligible for medical benefits of the Student Health Service. Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, X-ray work and referrals to specialists or other outside physicians) are the responsibility of the student. Within the Student Health Service, there will be only a few small charges for some services, such as materials for an allergy injection series, overseas immunizations, and certain other services.



Any student who intends to train for an athletic team is required to pass a thorough medical examination. The University is not responsible for injuries received in intercollegiate or intramural games, or in any of the activities of the Department of Physical Education, Health, and Recreation.

HEALTH AND ACCIDENT INSURANCE

The Student Health Service Office has arranged for Health and Accident Insurance, on an elective basis, for *full-time* students registered on campus. Interested students should contact the Student Health Service Office.

STUDENT EMPLOYMENT

The Law Center helps in the placement of its students and maintains a placement service for that purpose. In addition, the Student and Alumni Career Services Office, Woodhull House, 2033 G Street, N.W., provides assistance to students seeking full-time, part-time, or temporary employment. This Office maintains a registry of positions available and refers qualified applicants for consideration. Information is also available on Civil Service examinations.

A student taking more than ten semester hours must limit outside employment to less than twenty hours (see "Academic Work Load," page 39). It is urged that full-time students refrain from engaging in outside employment during their first year. Although work in some special areas may contribute to the learning and experience of the student, as a general rule it will compete with time needed for adequate study and preparation, which are at the heart of a good legal education.

PLACEMENT SERVICE

The Law Center takes a continuing interest in the placement of its graduates in private practice and governmental service as well as with industry and commerce. The Dean, the Faculty, and the Placement Office cooperate in collecting information from alumni, law firms, and government agencies concerning opportunities in legal positions throughout the country. Senior law students and recent graduates are urged to keep in touch with the Placement Office.

VETERANS EDUCATION

The Office of the Registrar, Luther Rice Hall, 2121 Eye Street, N.W., assists students entitled to educational benefits as veterans or war orphans with any problems which may arise concerning their benefits. This Office also processes certification of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans should consult the Office of the Registrar prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D.C. 20421.



COURSES OF INSTRUCTION

THE COURSES OF INSTRUCTION listed below are subject to change. The University reserves the right to withdraw any course announced.

The number of hours of credit given for the satisfactory completion of a course is indicated in parentheses after the name of the course. Thus, a year course giving two hours of credit each semester is marked (2–2), and a semester course giving two hours of credit is marked (2).

In most courses, a final examination is held during the examination period, and the grade in the course is determined in large part by that examination. These courses are parenthetically marked "Examination."

Courses that require the preparation of a major research paper in lieu of an examination are parenthetically marked "Research Paper." The satisfactory completion of such a paper by a student individually will satisfy the Legal Writing curriculum requirement for the J.D. degree.

Courses parenthetically marked "Problem Assignments," "Writing Assignments," "Take-home Examination," "Choice of Paper or Examination," or "Clinical Work" indicate the nature of the method planned by the instructor for determining in major part the grade he will give for the course. A course marked with any of these designations will not satisfy the Legal Writing curriculum requirement for the J.D. degree.

Day classes begin at 9:10 a.m. and run throughout the entire morning and afternoon. Evening classes begin at 5:50 p.m. Many examinations for both day and evening classes may be given in the afternoon only. Examinations for day students may be held in the evening only.

A parenthetical designation at the end of a course description indicates whether the course is scheduled to be offered in the spring or fall semester or in the summer sessions, and also usually whether it will meet in the day or evening. When a double-numbered course is designated "Academic year," the first half of the course is scheduled to be offered in the fall, the second half in the spring. Courses with no parenthetical designation indicating time of offering are not scheduled to be given during the 1974 summer sessions or the 1974–75 academic year.

COURSES FOR JURIS DOCTOR CANDIDATES

Required courses are numbered from 201 to 300. Courses numbered from 301 to 400 are normally taken by second- and third-year students. Courses num-

bered from 401 to 600 are generally more advanced. Second-year students may take courses numbered above 400 only with the permission of the Dean. Third-year students are encouraged to take one course numbered above 400 each semester, and may take more than one such course with the permission of the Dean.

The following courses are among those offering clinical work: Law 343, 345, 346, 394, 396, 399, 458, 459, 479, 487, 508, 509, 579.

REQUIRED COURSES

203–4 **Contracts I–II** (4–2) Nash, Cibinic, Pock, Ginsburg

Legal remedies of contracting parties, including damages in contract and quasi-contract, specific performance, reformation, recission, remedies in tort; acts creating and terminating contractual rights, including offer and acceptance, mistake, problems of proof; function of consideration; conditions; assignments; third-party beneficiaries; effect of changed circumstances; protection of the client's interests upon breach or threat of breach by the other party. Emphasis on problems of analysis, draftsmanship, adversary method. (Examination) (Academic year—day and evening)

207 **Torts** (4) Merrifield, Seidelson, Park, Banzhaf, Schwartz, Sirulnik

Liability for harm to person or property. Intentional torts, negligence, nuisance, products liability, misrepresentation, defamation, and invasion of privacy; fault and other basis for shifting losses; causation; damages; effects of liability insurance; problems under Federal Tort Claims Act. (Examination) (Fall—day and evening)

211 **Property** (4) Starrs, Schiller, Brown, Reitze

Basic concepts of personal property. Real property: historical background of the law of estates and conveyancing, types of estates, dower and curtesy, landlord and tenant relationship, concurrent estates, future interests at common law and after the Statute of Uses; introduction to modern conveyancing—the real estate contract, the deed, the recording system, methods of title assurance. (Examination) (Fall—evening; spring—day; summer 1974)

212 **Constitutional Law** (4) Dixon, Miller, H. Green, Mayo, Barron

Basic principles of American constitutionalism; judicial function in constitutional cases; implementation of doctrines of separation of powers, federalism, limited government; development and exercise of national powers; introduction to civil rights and liberties. (Examination) (Spring—day and evening)

215 **Criminal Law and Procedure** (4) Starrs, Allen, Robinson, Ferster, Sirulnik

Origin and purposes of criminal law; elements of criminal liability; mental disorders; crimes against the person, property, and against both; statutory offenses; criminal procedure, with consideration of Federal Rules of Criminal Procedure. (Examination) (Fall—day; spring—evening)

218 **Civil Procedure** (4) Sharpe, Schwartz, Park, Ferster, Kayton, Barron

Mechanics of litigation—rules which govern the process by which rights and duties studied in substantive law courses are enforced: pleadings, discovery, pre- and post-trial motions, jurisdiction and venue, equity jurisdic-

tion and trial by jury, former adjudication. Emphasis on Federal Rule of Civil Procedure, but principles and main problems indigenous to state procedural systems are developed. (Examination) (Spring—day and evening)

220 **Legal Research, Writing, and Professional Responsibility and Ethics** (2) Seidelson and Staff
(Formerly Legal Research and Writing)
Introduction to and practical experience in the use of a law library; instruction and practice in legal writing, including a memorandum and appellate court brief; instruction and experience in the preparation and argument of an appellate court case; instruction in questions of professional responsibility and ethics. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. For credit, a student must attain a minimum grade of 65. (Fall—day and evening)

232 **Evidence** (4) Seidelson, Robinson, Albert
Preparation and presentation of evidence, including proof of writings; qualification and examination of witnesses with emphasis on impeachment; privilege; opinion testimony; determination of relevancy; demonstrative, experimental, scientific evidence; application of the hearsay rule. (Examination). (Spring—day and evening; summer 1974)

ELECTIVE COURSES

302 **Admiralty** (2) Sharpe
Doctrines originating in admiralty courts—prize, maritime, liens, salvage, general average, negligence in ship collisions and otherwise, maintenance and care, unseaworthiness; maritime law from legislative origins—personal injury and death remedies, limits on shipowners' liability, regulation of carriage of goods and persons; admiralty jurisdiction and maritime law in the federal system. (Examination) (Fall—day)

304 **United Nations Law and World Order** (2) Mallison
Introduction to international law through study of law and practice of United Nations Charter; structure and process of decision of United Nations; maintenance of international peace and security—peaceful settlement of disputes and national and collective self-defense; formulation and implementation of human rights. Complements but does not repeat the material in Law 305. (Examination)

305 **International Law and World Order** (2) Mallison
Traditional content of introductory course in international law presented in context of values and institutions of world community; emphasis upon national states as participants in decision-making processes with consideration also of individuals; analysis of range of available sanctions; roles and effects of international agreements under United States Constitution. Complements but does not repeat material in Law 304. (Examination) (Fall—day and evening)

307 **Comparative Law** (3) Albert, Liebesny
A general introduction to the world's main legal systems with emphasis on civil law. Comparative study of the administration of justice, procedural problems, and selected substantive legal institutions. (Examination) (Spring—day; summer 1974)

309 **Conflict of Laws** (3) Dixon, Seidelson, Pock, D. Green

Legal problems arising from occurrences transcending state or national boundaries; jurisdiction; foreign judgments; constitutional influences; theoretical bases of choice of law principles and their application to specific fields, including torts, contracts, property, family law, administration of estates, business associations. Green (Problem Assignments) Dixon, Seidelson, Pock (Examination) (Fall—evening; spring—day; summer 1974)

311 **Agency and Partnerships** (2) Sharpe, Schiller

Legal principles concerning association in business by agency, partnership, other unincorporated forms, and corporations; creation, form and nature of agency, partnership and corporation; basic principles of agency and partnership and introductory related principles of corporation law. (Examination) (Fall—day and evening)

312 **Corporations** (4) Kirkpatrick, H. Green, Stevenson

Corporate law, with emphasis on operations and financing of corporations. Control of corporations, action by corporate directors, officers, shareholders. Control devices. Directors' and shareholders' duties of care and loyalty, insiders' transactions in shares of the corporation. Derivative suits, kinds of shares, dividends, corporate distributions. (Examination) (Fall—day; spring—evening; summer 1974)

313 **Sales and Sales Financing** (2) Albert, Rothschild, Ginsburg

Provisions of the Uniform Commercial Code relating to sale and distribution of goods, including bulk transfers, warehouse receipts, bills of lading, and other documents of title; particular attention to secured transactions and financing devices utilized in this connection. (Examination) (Fall—day and evening; spring—day; summer 1974)

314 **Commercial Paper, Check Collection, and Banking** (2) Albert, Rothschild, Schwartz, Ginsburg

Classic view of negotiable instruments as codified by Article III of the Uniform Commercial Code. Check collection: the system in theory as expressed in Article IV of the Uniform Commercial Code and the system in practice; Federal Reserve regulations, Clearing House agreements, and automation systems. The dual banking system, work of the Comptroller General and the Federal Reserve Board. Legal problems concerning interest and the checkless society. (Examination) (Fall—day; spring—day and evening; summer 1974)

318 **Creditors' Rights** (3) Kirkpatrick

Creditors' remedies outside bankruptcy—compositions, agreements, general assignments; bankruptcy proceedings under the federal statute, administration, discharge, the position and powers of the trustee, preferences; corporate reorganization under Chapter X of the Bankruptcy Act. (Examination) (Fall—day and evening)

321-22 **Current Decisions** (2–2)

Limited to members of the student staff of the *Law Review*. A maximum of 4 semester hours of credit may be earned in this course. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Academic year—day and evening)

323 **Journal of International Law** (1 or 2)
(Formerly International Law)
Limited to editors of the student staff of the *Journal of International Law and Economics*. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged)

325–26 **Trusts and Estates I–II** (3–3) Weaver, Kuhn, Garvey
Noncommercial transfers of wealth at death or during life. Law 325: essential elements and formalities for creation of trusts and execution of wills, revocation and alteration, grounds for contest, limits on property owner's power to control, intestate succession. Law 326: dispositive provisions, common questions of construction, future interests problems, administration of estates and trusts, charitable trusts. Prerequisite to Law 325: Law 211; to Law 326: Law 325. (Examination and Problem Assignments) (Law 325: fall—day and evening; spring—day; summer 1974. Law 326: spring—day and evening)

327 **Modern Real Estate Transactions** (2) Brown, Schiller
Advanced problems in purchase and sale of real estate: legal responsibility and functions of buyer, seller, broker, escrow agent, conveyancing attorney, title examiner, abstractor, insuror of title; process of examination and assurance of title and other interests in realty, including recording, registration and title insurance systems, settlements and closings, warranties, hazard insurance; emerging problems related to cooperatives, condominiums and property-owners' associations; problems related to compliance with subdivision, zoning, building and housing code regulations. (Examination) (Spring—day)

329 **Unfair Trade Practices** (3) Weston, Harris, Banzhaf
Unfair trade practices at common law and under statutes; trademarks, trade names; copyright law; misappropriation of ideas; protection of competitors and consumers against false advertising under Federal Trade Commission Act; resale price maintenance under state Fair Trade Acts, state sales-below-cost statutes; Robinson-Patman Price Discrimination Act, miscellaneous business practices. (Examination) (Fall—day and evening)

330 **Federal Antitrust Laws** (3) Weston, Kirkpatrick
Sherman and Clayton Acts, related statutes. Price-fixing agreements and other types of trade restraints considered under Section 1; monopolizing considered under Section 2 of the Sherman Act. Mergers and tie-in sales, other activities under the Clayton Act. All types of business conduct raising questions under the antitrust laws, including trade association activities, exclusive-dealing arrangements, boycotts, patents and copyrights. (Examination) (Spring—day and evening)

331 **Product Liability** (2) Schwartz
Development of the concept of product liability and consumer's remedies. Specific problems and processes in evaluation of risk and benefit encountered in government regulation of dangerous and defective products. Survey of civil actions for harm resulting from defective and dangerous products with reference to parties and proof in negligence, warranty, nuisance, fraud, misrepresentation, and other cases. Problems associated with hazard identification, insurance, and industry self-regulation. Review of Consumer Product Safety Act and current legislation dealing with injuries and remedies in specific areas. (Examination) (Fall—day)

332 **Federal Jurisdiction** (2) Sharpe, Schwartz, Albert, D. Green, Barron

Relationship of federal courts to Congress and to the states, through analysis of cases dealing with federal judicial functions (including problems of advisory opinions, standing to litigate, justiciability), federal questions in federal courts, federal review of state court decisions (including relation between state and federal substantive law, procedural problems in exercising review, application of law to fact). Sharpe, Albert—(Examination); Green—(Problem Assignments) (Fall—day and evening; summer—1974)

334 **Advanced Criminal Procedure** (2) Starrs, Robinson, Ferster

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Starrs—(Examination and Problem Assignments); Robinson, Ferster—(Examination) (Fall—day; spring—day and evening)

335 **Jurisprudence** (2) Mayo, Kramer

Basic jurisprudential concepts; nature of law; development of legal institutions; jurisprudential schools—natural law, analytical, historical, sociological, functional; law and logic; law and justice; the judicial process; legislative, executive, administrative decision-making; impact of politics, economics, and scientific advance on legal systems; contemporary trends in jurisprudential thought. Mayo—(Examination); Kramer—(Writing Assignments) (Fall—evening; spring—day)

336 **Taxation—Federal Income** (3) Weaver, Hambrick, Speiller

Survey of substantive provisions of federal income tax law, including concept of gross income, provisions affecting taxation of family and individual transactions, limitations on allowable deductions, sales and dispositions of property, problems of capital gains taxation, nontaxable exchanges. Weaver—(Examination and Problem Assignments); Hambrick—(Examination) (Fall—day and evening; summer 1974)

338 **Taxation—Federal Estate and Gift** (2) Kramer, Hambrick

Survey of substantive provisions of federal estate and gift tax laws, including inter vivos transfers, transfers in contemplation of death, joint interests, life insurance proceeds, property subject to powers of appointment, marital deduction and split gifts; tax procedure. (Examination) (Fall—day and evening)

339 **Collective Bargaining and Labor Arbitration** (3) Merrifield, Rothschild

Collective labor agreement: content, negotiation, administration through grievance procedure and arbitration; problems in settlement of labor disputes. Merrifield—(Examination and Problem Assignments); Rothschild—(Problem Assignments) (Spring—day and evening)

340 **Taxation—Federal Income, Corporations and Shareholders** (3) Hambrick, Tannenwald, Tucker

Continuation of Law 336. Primary emphasis on corporate-shareholder relationships. Problems of corporate dividends, redemptions of stock, distributions in partial and complete liquidation, stock dividends, bail-outs, and dividends in kind closely analyzed. Federal income tax problems involved in the formation of corporations, the sale of corporate businesses (including collapsible corporations), mergers and acquisitions, and corporate divisions. Students who have received credit for former Law 337 cannot receive credit for Law 340. Prerequisite: Law 336. (Examination) (Fall—evening; spring—day)

341 **Labor Law** (3) Merrifield, Albert, Rothschild

Law governing labor-management relations, organizations and representation of employees, regulation of economic weapons, enforcement of collective bargaining agreements, interunion and intra-union relations. (Examination) (Fall—day and evening; summer 1974)

342 **Moot Court** (1 or 2) Staff

Limited to the winners of the upperclass competition in the fall and the first-year competition winners in the spring. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring)

343 **Law Students Civil Rights Research Council (LSCRRC)** (1 or 2) Staff

Clinical projects concerned with the legal problems of civil rights. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged)

344 **Legal Writing** (1 or 2) Staff

Preparation of a research paper under the supervision of a full-time member of the Faculty who will determine, prior to registration, whether the work required for the topic selected justifies one or two semester hours of credit. If elected for one hour of credit, this course may be repeated to meet the legal writing requirement for the degree. Approval of the faculty member is required prior to registration. (Research Paper) (Fall and spring—as arranged; summer 1974)

345 **Students-in-Court** (4) Staff

Open only to third-year law students. In the D.C. Law Students in Court Program, students represent indigent litigents in the Small Claims, Landlord-Tenant, and Criminal (misdemeanors) division of the D.C. Superior Court. Their duties include client interviews, investigation, settlement negotiations, preparation and argument of motions, and conduct of trials. Students are required to spend one day in court and attend seminars each week (Wednesday or Thursday evening at the student's option in the civil program; Monday evening and Saturday morning in the criminal program). Some seminars will be held off campus. Application must be made during the spring semester of the preceding academic year; preference will be given to students with a cumulative-grade average above 75; however, consideration is given to past participation in clinical or extracurricular activities or employment which provides background for litigation and working with indigents. Students may participate during the summer, during the full academic year, or during the summer plus one other semester. This course may not be taken at the same time as Law 487, 579, or any litigating activities in Law 346. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged; summer 1974)

346 **Legal Aid** (arr.) Staff

Work done in connection with the Legal Aid Bureau under the supervision of the faculty adviser, who will determine, prior to registration, the number of semester hours of credit the work required will justify and whether the student has all prerequisites. Any litigating activities of this course may not be taken at the same time as Law 345, 487, or 579. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged)

347 **Insurance (2)** **Schiller, Pock**

A primary risk distributing medium and the rules by which legislative, administrative, judicial bodies seek to promote its benefits and avert its dangers. Includes insurance marketing, insurable interest, subrogation, transfer of insurance benefits to nonpolicyholders, coverage and other insurance policy provisions, disposition of claims. (Examination) (Fall—day and evening; summer 1974)

348 **Domestic Relations** (2) Kayton, Seidelson, Potts, Ferster

Marriage, annulment, and divorce; adoption and custody of children; economic relations. Seidelson, Potts—(Examination); Ferster—(Problem Assignments); Kayton—(Examination, Research Paper, and extensive interdisciplinary readings) (Fall—day and evening; spring—day)

349 **Local Government Law** (2) **Pinsky**

Decision-making processes in metropolitan and local communities; types and objectives of city, county, special-function local government units; intergovernmental relations; original organization and changes; personnel; local lawmaking; responsibility in tort; introduction to community planning. (Examination) (Spring—evening)

351 **Law and Accounting (2)** **Cibinic, Ginsburg**

Study of fundamental accounting principles with emphasis on corporation accounting; legal and accounting implications of specific items in financial statements of corporations; inventory adjustments; corporate transactions, distributions, capital adjustments. Strongly recommended for students who have had no accounting. (Examination and Problem Assignments) (Fall—day and evening)

355 **Government Contracts** (3) **Nash, Cibinic**

Survey of basic law underlying government procurement, basic power and limitations on federal government in entering into contracts, administrative and legislative policies governing these contracts, advertised and negotiated procurement procedures, forms of contracts and clauses used. Law 431 *Government Procurement Law* is the substantial equivalent of this course. (Examination and Problem Assignments) (Spring—day)

359 **Patent Law** (3) **Kayton, Harris**

Law of patents subsequent to issuance of patent; nature of patent as property and as a legal instrument; validity—novelty, nonobviousness, commercial success; infringement—direct and contributory, doctrine of equivalents and file-wrapper estoppel. Substantive concepts introduced in an order approximating patentee's and infringer's cases in litigation. Designed for students intending to specialize in patent law; knowledge or experience in patent law helpful but not prerequisite. (Examination) (Fall—evening; spring—day)

362 **Patent Office Practice** (2) **Kayton, Harris**

Substantive and procedural law of patents leading to issuance of patent, mainly related to proceedings before U.S. Patent Office. Obtaining and preserving earliest possible patent filing date; continuing applications, res judicata, novelty and nonobviousness requirements; substantive rules of priority of invention and related affidavit practice; nature of claims and formal defects; restriction and double patenting. Designed for students intending to specialize in patent law. Prerequisite: Law 359. (Examination) (Spring—evening)

372 **Administrative Law** (3) Miller, Park, Banzhaf

Study of the administrative process in executive and independent regulatory agencies; emphasis on judicial review. Formal and informal decision-making, investigation, planning, and public administration functions of the agencies as related to their legal limits and to the roles of lawyers in government and private practice. Relationships of agencies to the executive and legislative branches, to public and private interest groups, and to the social, political, and economic aspects of various philosophies of government regulation. Miller—(Research Paper); Park—(Examination and Writing Assignments); Banzhaf—(Examination) (Fall—day; spring—evening; summer 1974)

375 **Remedies** (3) Cibinic, Ginsburg, D. Green

Development and use of judicial remedies that give relief for past or threatened injuries to interests of personalty and property. Remedial approaches include compensatory and punitive damages, injunctions, unjust enrichment, constructive trusts, equitable liens, tracing, subrogation, and specific reparation. Emphasis on comparing remedial options in fraud, mistake, duress, breach of contract, and abuse of fiduciary relationships. Cibinic, Ginsburg—(Examination); Green—(Problem Assignments) (Spring—day and evening)

377 **Legislation** (2) Ferster

Legislative process and roles of participants in the process; operation of United States Congress and state legislatures, including fact finding, organization, procedure. Statutory interpretation emphasized to provide foundation for more advanced courses. (Examination) (Spring—day)

380 **Environmental Law** (3) Reitze

Government control of environmental pollution; the National Environmental Policy Act; solid waste management; noise, water, and air pollution control; and common law remedies. (Examination) (Spring—day)

381 **Environmental Planning** (3) Reitze

(Formerly Environmental Law II)

Survey of the law of environmental planning, including selected topics of land use planning, mining, forestry, energy, transportation, public land law, and ocean protection. (Examination) (Fall—day)

385 **Trial Practice Court** (2) Jackson, Ryan, Kendrick, Skinker, Stevas, Altshuler, Nunzio, McArdle, Seidel

Trial of assigned cases, trial tactics and techniques, pre-trial and courtroom procedures pursuant to federal rules. Students may repeat this course once for credit. Prerequisite: forty-two semester hours, including Law 218. Prerequisite or concurrent registration: Law 232. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and Spring—day and evening)

389 **Medicine for Lawyers** (2) Hirsh

Survey of the basic medical sciences and the rudiments of clinical medicine as encountered in the practice of law. Medical terminology, the disease process, trauma, and industrial medicine. The application of this fundamental information is demonstrated in personal injury or negligence and malpractice litigation as well as in commitment and equitable proceedings. Students may witness autopsies at the D.C. Medical Examiner's

Office, surgery at George Washington University Hospital, and medical rounds at D.C. General Hospital. Emphasis on enabling the lawyer to communicate most effectively with medical specialists. (Examination) (Fall—day)

390 **Forensic Medicine** (2) — **Sharpe, Head**

A survey of interprofessional relations between physicians and lawyers in the office, the hospital, and the courtroom, with incidental attention to laboratories, legislatures, and administrative agencies. Undergraduate law students and second-year medical students study how their professions accommodate conflicts between economics and ideals, and how they exercise judgment in applying their technical skills. (Examination) (Fall—day and evening)

394 **Women and the Law** (2) — **Bloomfield, Wolf, Dorian**

An examination of the treatment of women in all areas of the law and of legal remedies for sex discrimination. Emphasis on constitutional law, criminal law, discrimination in the media, education, and employment. Students choose clinical projects or research papers on which to focus the semester's work. Enrollment limited to 30 students. (Research Paper) (Fall and spring—evening)

395 **Public Strategies in Tax Policy and Tax Reform** (2) — **Brandon, Stanton**

(Formerly Public Participation Strategies: Tax Policy)

Study of the formulation of tax legislation and administrative tax policy. Emphasis on the development of legal strategies to reform the present tax structure and its administration. Classic reform arguments, new approaches, and present legislative activity studied from the point of view of citizen action, lobbying, and other strategies to influence pending decisions. Open to a limited number of third-year students. Final grade based on class participation and a written project formulating reform strategy to deal with specific problems selected by the student. (Writing Assignment) (Fall—day)

396 **Legal Activism** (3) — **Banzhaf**

Study of the use of law and the legal process, not as a technique for resolving disputes between identified individuals and/or organizations, but as a powerful tool for ameliorating problems of general public interest. Principles and techniques of legal activism, maximum effectiveness of public interest actions, how these actions differ from conventional legal practice. To learn these techniques effectively, and to test and develop their proficiency in their use, students will form clinical project groups and initiate or participate in a legal or law-related activity directed against a public interest problem of their own choosing. (Fall—day)

399 **Clinical Law Work** (arr.) — **Staff**

Projects involving litigation, research, or public interest activities of a legal nature (including aid to indigents, support of public interest nonprofit corporations, and support of governmental agencies or courts) may be initiated and will be supervised by a faculty member. Projects must be approved in advance by the Law Center Supervisory Committee (three members) both as to whether the project is appropriate and as to the number of semester hours of credit to be granted. A maximum of 10 semester hours of credit may be taken in one or two semesters. This course is open to a limited number of third-year law students. The grade

CR (Credit) or *NC* (No Credit) is given for this course. (Fall and spring)

ADVANCED COURSES

ADMINISTRATIVE LAW: ECONOMIC REGULATION

Faculty Advisers: A.S. Miller, R.E. Park, G.E. Weston

402 **Executive Function** (2) Miller

Executive branch in constitutional theory; major trends in development of executive-administrative function; organization of executive branch; relationship of executive to Congress and judiciary; policy-making procedures within executive branch including role of Bureau of the Budget in national policy planning; case studies in exercise of executive power in such functional areas as national defense, race relations, national economy, foreign economic relations; role of law and lawyers in executive decisional and implemental process. (Research Paper) (Spring—day)

403 **Public Economic Policy and the Law** (2) Snow

Interrelation of law and economics in such subject-matter categories and decisional contexts as economic regulation of industry, fiscal policy planning, government research and development practices, foreign trade and investment, and public spending priorities. (Research Paper) (Fall—evening)

404 **Securities Regulation** (2) H. Green, M. Cohen, Mathews, Michaely

State and federal laws governing offering and distribution of securities to the public by corporate issuers and others, regulation of securities markets, rights and liabilities of purchasers under such statutes. Emphasis on statutes administered by Securities and Exchange Commission. (Take-home Examination) (Fall—evening; spring—day)

405 **Regulation of Securities Markets** (2) Rotberg, Eisenberg

Operation of over-the-counter and exchange markets, including competitive and monopolistic practices in each market; relationship of antitrust laws and securities regulations to concept of a free and open market place. role of regional exchanges and third market in providing competitive element in market; advantages and disadvantages of a fragmented market; minimum fee structure, rebates and their effect on merchandising of securities and financial soundness of industry; use and availability of economic data in evaluating performance of market place. The seminar will examine matters directly of interest to graduate law students, lawyers, economists, and political scientists. (Take-home Examination) (Spring—evening)

407 **Seminar: Regulation of Transportation I** (2) Hill

Principles of certification of rail, motor, water, and air carriers; elements and principles of rate-making; comparison of problems, procedures, and regulatory philosophies of the various regulatory agencies. (Examination)

408 **Seminar: Regulation of Transportation II** (2) Hill

History of development of modes of transportation in the United States; economic problems and growth of regulatory legislation and philosophy; the congressional power to regulate; the scope of federal regulation; divi-

sion of regulatory authority between federal and state governments; introduction to principles of certification and rate-making. (Examination) (Fall—evening)

412 **Food and Drug Law** (2) **Kaplan, Becker**

The Federal Food, Drug, and Cosmetic Act, and related laws. Consumer, government, and industry viewpoints. (Choice of Paper or Examination) (Spring—evening)

413 **Public Policy and Mass Media** (2) **Barron, Cohn**

Institutional structure of mass media and their interrelationships; psychological aspects of mass communications; continuing adjustments among public interest goals, the economic system, and technological developments; influence of and controls exercised by government, other institutions, and private groups; conflict between freedom of speech of the media and other major community interests; the media's relationships to the interests of dissident and minority groups and the access of these groups to the media. Cohn—(Research Paper) (Fall—day)

414 **Regulated Industries** (2) **Park**

Substantive problems of business regulation in terms of natural monopolies, licensed industries, subsidized industries, and safety regulation. Typical problems raised include the role of intervenors, the impact of regulation upon management and market behavior, the uses and abuses of economic evidence, the role of agencies' staffs, interagency planning and regulation, and the effects of judicial and legislative review. Each student selects one industry and develops his insight into economic regulation in terms of that industry's firms, market structure, growth and development, trade associations, and regulatory agencies. (Research Paper) (Spring —day)

417 **Seminar: Trade Regulation** (2) **Weston, Harris**

Group study of current problems relating to unfair trade practices and federal antitrust laws. (Research Paper) (Fall and spring—evening)

Master of Laws candidates in the area of Administrative Law: Economic Regulation who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
372 *Administrative Law*

OTHER RELATED COURSES

451 *Federal Programs in Urban Poverty*
493 *Intergovernmental Aspects of Technological Change*
494 *Use and Control of Atomic Energy and Space Technology*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
571 *Land Development Planning*
594 *Seminar: Privacy*

CORPORATION LAW

Faculty Advisers: H.P. Green, R.B. Stevenson, Jr.

422 **The Modern Corporation** (2) Miller

Analysis of the nature and role of the large business corporation in the American political economy; models of the corporation; the transnational or multinational enterprise; the concept of accountability as applied to corporate activities; reasons for the growth of large corporate enterprise; relationships of the "supercorporations" to other centers of decentralized power and to the government; the corporation as the basic planning unit of the American economy; application of the Constitution to the corporation. (Research Paper) (Fall—day)

424 **Business Planning** (2) H. Green, Stevenson, Flyer, Lewis

Integrated study of corporate, financial, tax, accounting, and SEC aspects of the following: organization of a small corporation; organization of a public corporation; stock dividends, recapitalization, and stock repurchases in the context of conflict between active stockholders of a close corporation and the family of a deceased active stockholder, corporate liquidations; corporate mergers and acquisitions; and divisions of corporations. Prerequisite: Law 312, 336, and 340. Enrollment may be limited. Green, Flyer, Lewis, Stevenson—(Problem Assignments) (Fall and spring—day and evening)

427 **Legal Aspects of International Business Transactions** (2) Nurick, Guttentag, Stevenson

U.S. law and practice, including current tax problems and U.S. restrictions on investment; brief comparison with British and civil law systems; international law, international contracts, choice of law; currency considerations; effect of SEC laws and regulations; international trade, including GATT and reciprocal trade arrangements; sources of finance, both United States and foreign, private and public, including international organizations; protection of property, settlement of disputes, and selected case studies. In addition to the regular lecturers, there will be guest lecturers in various specialties. Emphasis on current problems in international trade and investment. (Choice of Paper or Examination) (Spring—day and evening)

Master of Laws candidates in the area of Corporation Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

312 *Corporations*
313 *Sales and Sales Financing*
329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
340 *Taxation—Federal Income, Corporations and Shareholders*

OTHER RELATED COURSES

331 *Product Liability*
417 *Seminar: Trade Regulation*
431 *Government Procurement Law*
525 *Copyright Law*
526 *U.S. Trademark Selection, Use, Protection, and Franchising*

540 *Choice of Law and Forum in International Controls*
541 *Seminar: European Common Market*
555 *Taxation—Special Corporation Problems*
562 *Income Taxation of Foreign Business and Investment*

GOVERNMENT PROCUREMENT LAW

Faculty Advisers: J. Cibinic, Jr., G.J. Ginsburg, R.C. Nash, Jr.

431 **Government Procurement Law** (3) Nash, Cibinic

Survey of the law pertaining to government procurement, including an analysis of the unique features of government contracting and a discussion of the functions of Congress, the executive branch, and the courts in the procurement process. Law 355 *Government Contracts* is the substantial equivalent of this course. (Examination) (Fall—evening)

433 **Performance of Government Contracts** (3) Nash, Cibinic

Discussion of the substantive legal problems that most frequently arise during the performance of government contracts. Interpretation of specifications and the most generally used contract clauses, and analysis of the rights of the parties when performance in accordance with the terms of the contract is not obtained. (Examination and Problem Assignments) (Fall—evening)

434 **Government Contract Claims and Litigation** (2) Nash, Ginsburg

Analysis of the methods which can be used by the parties to a government contract to obtain legal relief, including detailed coverage of the disputes procedure, actions for breach of contract, and forms of equitable and extraordinary relief. (Examination and Problem Assignments) (Spring—evening)

435 **Seminar: Government Contracts** (2) Nash, Cibinic, Ginsburg

Research and discussion of selected problem areas. (Research Paper) (Spring—day)

OTHER RELATED COURSES

402 *Executive Function*
424 *Business Planning*
427 *Legal Aspects of International Business Transactions*
442 *Labor Standards*
494 *Use and Control of Atomic Energy and Space Technology*
495 *Legal Protection against Technological Hazards*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
535 *Negotiation: Concepts and Techniques*

LABOR LAW

Faculty Advisers: J.M. Albert, L.S. Merrifield, D.P. Rothschild

441 **Seminar: Disability Problems** (2) Doherty

Workman's compensation law, extension of no-fault principle into motor vehicle area, and national health problems. (Examination) (Fall—evening)

442 Labor Standards (2) *Ginsburg*

(Formerly Labor Standards and Equal Employment)

Analysis of the Fair Labor Standards Act, its scope and exemptions; the Civil Rights Act and other labor statutes; the laws establishing labor standards for government contracts, including the Davis-Bacon Act, Walsh-Healey Act, Service Contract Act, and Work Hours Act; the role of the Department of Labor, the Comptroller General, and the contracting agencies in interpretation, administration, and enforcement of these statutes. (Examination) (Spring—evening)

443 Labor Relations in the Federal Service (2) *Tobias*

Survey of labor relations in the federal service as governed by Executive Order 11491. Emphasis on the role of the Civil Service Commission, the Department of Labor, the Congress, and the President in the development of collective bargaining relationships between unions and the federal government. (Research Paper) (Fall—evening)

444 The Individual and His Union (2) *Gold*

Study of the legal relations between unions and their members with special emphasis on the right to fair representation, the right to union membership, compulsory union membership, the imposition of discipline upon union members, reporting requirements, the conduct of internal union elections, the fiduciary duties of union officers, the imposition of trusteeships, the regulation of racketeering, and political action of unions. Prerequisite: Law 341. (Examination) (Summer 1974)

445 Labor Relations in State and Local Governments (2) *Jascourt*

Analysis of the shifting and emerging legal concepts that affect the form, scope, and consequences of labor relations in schools and colleges and in municipal, county, and state governmental bodies. Survey of the varied statutory and de facto labor relations systems and their impact on the development of bilateral decision-making. Examination of (1) problems caused by the concurrent existence of civil service laws and the diffusion of governmental authority, (2) impasse resolution, and (3) strikes and other concerted activities. (Problem Assignments) (Spring—evening)

446 Equal Employment Opportunity (2) *Margolin*

This course covers the spectrum of federal laws and executive orders relating to all types of discrimination in employment, including Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972; the Equal Pay Act of 1963, as amended in 1972; the Age Discrimination in Employment Act; the Civil Rights Act of 1866; the Fourteenth Amendment; the National Labor Relations Act; Executive Orders 11246 and 11375 relating to government contractors (including the "Philadelphia Plan" and other government-imposed "affirmative action" plans and bid conditions, and Revised Order No. 4 relating to sex discrimination). The course includes the substantive and procedural rights available to employees of firms doing business with the government, as well as those of other private firms and state and local government agencies subject to the above federal legislation. (Examination) (Fall—evening)

447 Seminar: Labor Law (2) *Merrifield, Chanin*

Group study of contemporary problems in labor law. (Research Paper) (Spring—day and evening)

449–50 **Seminar: Labor Litigation** (1–1) Gold

Intensive study of recent Supreme Court and appellate court decisions in the area of labor law; special emphasis on the contrasting variables which influence the respective decision-making processes of the National Labor Relations Board and the courts. Particular attention to labor law cases pending before the Supreme Court for decision during the current term. Analyses of the briefs filed in pending cases; attendance at oral argument; post mortems of the arguments and decisions, with classroom participation by attorneys involved in some cases. Grades and credit for both halves of the course assigned only on completion of the second half. Enrollment may be limited. Admission by permission of instructor. Prerequisite: Law 341. (Research Paper) (Academic year: every other week—evening)

Master of Laws candidates in the area of Labor Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

339 *Collective Bargaining and Labor Arbitration*
341 *Labor Law*

OTHER RELATED COURSES

459 *Problems of the Consumer*
460 *Current Problems in Civil Rights*

LAW AND POVERTY

Faculty Advisers: R.S. Kuhn, D.P. Rothschild, J.E. Starrs

451 **Federal Programs in Urban Poverty** (2) Mirel

Students are given a chance to observe at first hand the problems inherent in implementing a federal policy to alleviate poverty through legislation. Students are assigned to work with individual poverty agencies in the District of Columbia on matters relating to the federal funding agencies. Discussions focus on various aspects of poverty law problems as lawyers deal with them—from conception of the legislative program, to Congressional debate, to administrative policies, to fund distribution, to litigation. (Research Paper) (Fall—day)

458 **Housing the Poor** (2) Starrs, Carrow

An in-depth analysis of current housing problems, including three main subjects: (1) Discrimination in housing. (2) Landlord and tenant relationship, including a discussion of leases and their clauses and of the eviction process, tactical and substantive defenses to it, and affirmative avenues of redress on behalf of the tenant; public housing and building code enforcement. (3) Home ownership by the poor, including its financing by instruments such as the deed of trust and the installment land contract as well as federal subsidy programs. Admission by permission of instructor. (Research Paper) (Spring—day)

459 **Problems of the Consumer** (2 or 3) Rothschild, Schwartz

Clinical treatment of consumer protection. Minimum of 8 hours work commitment each week required; 2-hour weekly class required in addition for 3 credits. Students purchase consumer protection materials and Text, and are divided into projects groups. For example, the National Law Center has negotiated with a commercial TV station to put on a series of

news spots dramatizing consumer problems and will also run a "Con
sumer Help Center." This activity will involve three groups: (1) a grou
to work with the station on programming, (2) a group to run the Con
sumer Help Center, and (3) a research group to investigate the result
of complaint intake, referral, and disposition. Other students will work
in inner-city store-fronts, with county government agencies, and on the
editorial staff of the *Consumer Protection Reporting Service*. The grade
CR (Credit) or *NC* (No Credit) is given for this course. (Fall and
spring—day; summer 1974)

460 **Current Problems in Civil Rights** (2) Kuhn

Uses of law in the effort to achieve racial equality, in areas such as (1)
discrimination against minority groups and the poor in land use and
zoning, (2) school desegregation, and (3) employment discrimination.
The class is divided into groups, each dealing with a problem situation in
one of these areas. Students represent fictitious clients, write briefs, and
argue in class before a student panel of judges, which then writes an
opinion. Grades are based on these written and oral presentations, plus
brief critiques of other groups' presentations. (Problem Assignments)
(Spring—day)

OTHER RELATED COURSES

441 *Seminar: Disability Problems*
472 *Administration of Criminal Justice*
475 *Law and Criminology I: Search for the Causes of Criminal Behavior*
476 *Law and Criminology II: Society's Responses to the Criminal Offender*
477 *The Police and the Community*
560 *Taxation—State and Local*
571 *Land Development Planning*
575 *Community Economic Development*
590 *Population Control and the Law*
592 *Seminar: Constitutional Law*

LAW, PSYCHIATRY, AND CRIMINOLOGY

Faculty Advisers: R.C. Allen, T.F. Courtless, Jr., E. Ferster

472 **Administration of Criminal Justice** (2) Allen

Consideration and analysis of selected advanced problems in the admin
istration of criminal justice. The subject matter covered will vary from
year to year, with concentration in areas of current interest and dynamic
change (e.g., right to counsel, arrest and interrogation, search and seizure,
prejudicial publicity, discovery, electronic interception, mental impair
ment). Emphasis will be placed on the role and professional responsibili
ties of prosecutor and defense counsel and on developmental trends in the
law. (Research Paper or Examination)

473 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (2) Starrs

Designed to acquaint the student with the operations of a modern crime
laboratory and the courtroom acceptability of testimony of forensic scien
tists and other evidence on laboratory test results. Identification of in
dividuals (fingerprints, palmprints, footprints, voiceprints, anthropological
reconstruction, hair identification, and serology), identification of objects
(ballistics, handwriting, typewriting, fiber identification, paints, varnishes

glass, wood, and paper), toxicology, pathology, forensic use of the microscope and the camera, the coroner and the medical examiner systems, and drug law enforcement. Visual aids, crime laboratory guest lecturers, and field trips to crime laboratories. (Research Paper)

475 **Law and Criminology I: Search for the Causes of Criminal Behavior** (2) — Courtless

Role which criminological knowledge of crime causation may play in assisting lawyers to appraise the effectiveness of various alternative social and legal devices in controlling deviant behavior. The search for factors related to criminal behavior will be developed historically, with emphasis on current causal theories developed by various disciplines. Model as well as operational penal codes, sentencing and probation practices, and specialized facilities will be analyzed in terms of their relationship to such casual theories. (Research Paper) (Fall—day)

476 **Law and Criminology II: Society's Responses to the Criminal Offender** (2) — Courtless

Study of the development and current use of society's three major approaches to the handling of offenders: punitive, mechanical, and correctional. Emphasis on society's changing responses to criminal and delinquent behavior, and research findings concerning effectiveness of these responses. Analysis of treatment strategies to facilitate communication between members of the legal profession and behavior scientists charged with effectuating these strategies. Prerequisite: Law 475. (Research Paper) (Spring—day)

477 **The Police and the Community** (2) — Allen, Courtless

Problems and potential of contemporary urban law enforcement: the role and perspective of the police officer; the police *qua* organization; "styles" of law enforcement; law enforcement in the inner city; relationship with ethnic minorities; civil disorder; police-community relations; methods in arrest and investigation; complaint review procedures; science and technology in law enforcement; police handling of juveniles; crime and crime statistics. (Problem Assignments)

478 **Post-conviction Dispositions** (2) — Skoler

Study of the practice, problems, and alternatives facing a defendant, and discussion of the goals and standards for the criminal justice system. Enrollment limited to 25 students. Students who receive credit for Law 478 cannot receive credit for Law 480. (Examination) (Spring—day)

479 **Seminar: Criminal Practice** (2) — Perazich, Schaffer

For students who expect to be involved in the trial of criminal causes. Weekly classroom sessions with emphasis on clinical training; students will be assigned to attorneys drawn from the private bar in the District of Columbia as well as from the Public Defender Service, who are actively engaged in the trial of criminal matters. Students serve as investigators, research assistants, and perhaps as co-counsel during the preparation and trial of criminal cases. Active participation in all stages of the criminal litigation including client and witness interviews, plea bargaining, bail proceedings, pretrial motions, and the trial itself. Enrollment limited to 20 third-year or graduate students. Prerequisite: Law 334. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring —day)

480 **Dynamics of the Law of Criminal Corrections** (2) Barki

Study of the statutes and potential problems facing a defendant, includi mental fitness to proceed to trial, probation, sentencing, parole, corre tional institutions, rights of prisoners. Enrollment limited to 25 student Students who receive credit for Law 480 cannot receive credit for La 478. (Examination) (Fall—evening)

485 **Seminar: Health Care Delivery Systems** (2) Sharpe, Cotto

Study of the role of the lawyer in existing and proposed national system for delivering health care. Students will gain familiarity with the con cepts and terms in health care delivery by working with issues in the design, finance, and administration of existing arrangements; examination of the means of reconciling the expectations of various groups of healt care service consumers and providers. (Research Paper) (Spring— evening)

486 **Seminar: Law and Psychiatry** (2) Allen, Silverberg

Designed to (1) expose the lawyer to some of the constructs of dynamic psychiatry dealing with human personality and behavior, and to relate them to problems encountered in legal practice; (2) provide information —both psychiatric and legal—bearing upon such topics as mental illness and tort liability ("traumatic neurosis," malpractice, commission of torts by mentally ill persons); hospitalization of the mentally ill and mentally retarded; guardianship; ad hoc determinations of incompetency (testamentary, contractual, and donative capacity; capacity to marry, have custody of children; mental illness as a ground for divorce; eugenic sterilization) mental illness and the criminal law (psychiatric evaluations in criminal cases, determinations of competency to stand trial, criminal responsibility), and (3) examine the role of psychiatry in legal settings, including the effective use of the psychiatrist and psychologist as expert witness. (Research Paper) (Fall—day; summer 1974)

487 **Child Advocacy** (4) *Ferster*

(Formerly Interdisciplinary Seminar on the Juvenile Court (3))

Clinical program in juvenile law. Enrollment limited to 10 third-year students or Master of Laws candidates. Admission by permission of instructor. Students are required to spend one day in court and attend seminars each week. This course may not be taken at the same time as Law 345, 579, or any litigating activities in Law 346. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Problem Assignments) (Fall and spring—day)

OTHER RELATED COURSES

390 *Forensic Medicine*
591 *Legislative Drafting*
592 *Seminar: Constitutional Law*

LAW, SCIENCE, AND TECHNOLOGY

Faculty Adviser: H.P. Green

491 **Science Policy Formulation** (2) Anderson

Recent and forthcoming important governmental decisions in science and technology; the role of law as a science policy implement; law in the decision-making process; risk-benefit decisions by Congress, the administra-

tive process and the courts; bringing health, safety, environment, and aesthetics into technology assessment. (Research Paper)

492 **Seminar: Science and the Legal Process** (2) H. Green

Reciprocal relationships between law and science; absorption of scientific concepts into substantive law through adjudication, legislation, and rule-making; techniques and procedures used in handling, developing, and deciding scientific issues. (Research Paper) (Fall—evening)

493 **Intergovernmental Aspects of Technological Change** (2)

Role of technology in breaking down political barriers and leading to intergovernmental measures to control or advance technological progress within the United States and on an international basis. Specific legal devices and institutions employed in intergovernmental handling of technological problems. (Research Paper)

494 **Use and Control of Atomic Energy and Space Technology** (2) H. Green, Ramey

Problems resulting from revolutionary scientific developments of recent years. Impact of advanced technologies on the law and legal institutions. Laws and regulations relating to atomic energy and space including civilian uses, licensing, security, international, and patent considerations. (Research Paper) (Spring—evening)

495 **Legal Protection against Technological Hazards** (2) Dembling, Brown

The growth and development of law and legal institutions to protect society against the hazards inherent in new technologies with particular emphasis on the progress of reconciling the protection of the public with the desire for rapid progress. (Research Paper)

OTHER RELATED COURSES

380 *Environmental Law*
381 *Environmental Planning*
402 *Executive Function*
412 *Food and Drug Law*
413 *Public Policy and Mass Media*
431 *Government Procurement Law*
505 *Intergovernmental Relations I*
507 *Natural Resources Law and Policy*
531 *International Law of Air and Space*
532 *International Law of the Sea*

LAND USE MANAGEMENT AND CONTROL

Faculty Advisers: J.M. Brown, L.A. Schiller

501 **Land Development Law** (3) Brown

Study of the basic public and private means used by society to manage and control land use, such as zoning, subdivision regulation, pending codes, eminent domain, and privately contracted conditions, covenants, and restrictions. Identification and analysis of emerging new land control processes and the roles played by public and private entities involved in or

affected by land use management and control efforts at the various echelons of government. Students participate in a game-simulation process representing a specific complex situation in land use conflicts involving their inherent technological, social, economic, political, and legal elements. In the model situation students will assume roles as attorneys and work with assigned "clients." (Client-oriented written work and class participation) (Fall—day; summer 1974)

502 **Water Resources Law** (2) Hedeman

Introductory survey course in the law relating to water resources. History and development of water rights systems in the United States using a comparative analysis of Eastern and Western water law doctrines, the trends toward their modification, and study of the increasing influence of federal laws and projects. Identification of federal-state-local relationships, conflicts, and institutions; consideration of river-basin management and inter-basin transfers; description of proposed creation of new sources. (Examination) (Fall—evening)

504 **Seminar: Current Problems in Land Use Controls** (2) Brown, Schiller

New and emerging concepts of regionalism considered in the light of actual problem situations and attempts being made by various echelons of government to provide effective and equitable land use management and control. Examination of actual problem areas of major concern, including constitutional, administrative, political, judicial, social, economic, and technological elements. Functional planning and decision-making with respect to selected problem areas and their strategical and tactical transactions examined within the compass of the broader policy considerations involved. Guest lecturers; clinical exposure to various government agencies responsible for cooperating with the selected problems. (Research Paper)

505 **Intergovernmental Relations I** (2) Nash

Study of federalism, emphasizing current techniques for achieving cooperation and coordination between federal, state, and local governments. Detailed consideration of devices used, including interstate compacts, grants-in-aid, and exercise of regulatory powers. (Writing Assignments)

506 **Intergovernmental Relations II** (2) Nash

Advanced seminar on multi-government activities and current topics on intergovernmental relations. (Research Paper) (Spring—day)

Master of Laws candidates in the area of Land Use Management and Control who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Masters program.

327 *Modern Real Estate Transactions*
349 *Local Government Law*
372 *Administrative Law*
380 *Environmental Law*
381 *Environmental Planning*

OTHER RELATED COURSES

403 *Public Economic Policy and the Law*
407 *Seminar: Regulation of Transportation I*

451 *Federal Problems in Urban Poverty*
458 *Housing the Poor*
460 *Current Problems in Civil Rights*
491 *Science Policy Formulation*
492 *Seminar: Science and the Legal Process*
494 *Use and Control of Atomic Energy and Space Technology*
495 *Legal Protection against Technological Hazards*
558 *Taxation—Real Estate and Income*
560 *Taxation—State and Local*
590 *Population Control and the Law*
591 *Legislative Drafting*
593 *Seminar: American Legal History*

ENVIRONMENTAL LAW

Faculty Adviser: A.W. Reitze, Jr.

507 **Natural Resources Law and Policy** (2)
(Formerly Law 503)
Study of key legal doctrines and their development in the law of water, mining, and oil. Systematic analysis of natural resource problems such as government and private interactions, multiple use and priorities of resources, and security of property rights. Examination of alternatives in resource policy development, and impact on private and public actions. (Research Paper)

508 **Environmental Litigation** (2) **B. Cohen**
Special problems of environmental lawsuits. Topics include pleadings, procedural problems, selection of the proper court, problems of proof, remedies, selection of parties, discovery techniques and trial preparation, and the use of expert witnesses and scientific evidence. Prerequisite: Law 380 or graduate status. Enrollment limited to 25 students. (Choice of Research Paper or Clinical Work) (Spring—evening)

509 **Clinical Studies in Environmental Law** (2 or 3 or 4) **Reitze**
The student works on a project in the environmental law field under the supervision of both the faculty director of the program and a lawyer practicing environmental law. The project may involve working with a government agency, a congressional committee, a private practitioner, or a nonprofit public-interest environmental organization. Admission to this course requires second-semester second-year, third-year, or graduate standing and permission of the Director of the Environmental Law Program. Students who have mastered the fundamentals of environmental law are selected for this course. Normally this will require completion of at least Law 380. In addition, consideration will be based on the other environmentally related courses taken including those in Natural Resources Law and in Law, Science, and Technology, as well as work experience and other demonstrated interest in environmental law. Students may repeat this course for a maximum of 8 semester hours of credit. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring —day)

510 **Energy and the Environment** (2) **Baldwin**
An examination of energy policy under conditions of historical energy growth, reduced growth, or no growth. Consideration of new energy sup-

plies and the legal, political, and economic problems concerning their d velopment.

Master of Laws candidates in the area of Environmental Law who have n taken the following courses or their equivalent as part of a Juris Doctor Bachelor of Laws program should include them in their Master's program.

380 *Environmental Law*
381 *Environmental Planning*

OTHER RELATED COURSES

403 *Public Economic Policy and the Law*
407 *Seminar: Regulation of Transportation I*
408 *Seminar: Regulation of Transportation II*
413 *Public Policy and Mass Media*
431 *Government Procurement Law*
491 *Science Policy Formulation*
492 *Seminar: Science and the Legal Process*
494 *Use and Control of Atomic Energy and Space Technology*
495 *Legal Protection against Technological Hazards*
501 *Land Development Law*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
532 *International Law of the Sea*
560 *Taxation—State and Local*
571 *Land Development Planning*
590 *Population Control and the Law*
591 *Legislative Drafting*

PATENT AND TRADE REGULATION LAW

Faculty Advisers: L.J. Harris, I. Kayton, G.E. Weston

521 **International and Comparative Patent Law** (2)

Origin of patent laws. Patent systems of major countries—United King dom, France, Germany, USSR, and others. Comparative topical survey kinds of patents, inventors and applicants, subject matter, novelty, ad ministrative procedures, oppositions, revocation, renewal fees, compulson licensing infringement, etc. International Convention for the Protection of Industrial Property: origin, membership, organization, substantive pro visions. Treaties in the making, Common Market patent system, Nordic Patent, Patent Cooperation Treaty, Council of Europe activities. Pre requisite: Law 359 and 362, or former Law 360. (Take-home Examina tion)

522 **Patent and Know-how Licensing** (2) Finnegan

The business and legal criteria necessary to implement and maintain suc cessful licensing programs; emphasis on the strategy and techniques that permit a proprietor of intellectual property to effectively exploit his status as the owner of a unique form of property. Subject areas covered are business objectives in licensing; legal outline of licensing situations; rights and duties of license parties; factors in selecting which inventions to li cense—financial, legal, and commercial; finding and selecting the right licensees; determining and negotiating the terms and clauses of the con

tract; administering and enforcing the license; antitrust and misuse constraints on the business and law of licensing; tax factors affecting the patent and know-how contract; special problems in trade secret, know-how, and show-how contracts; international licensing. Prerequisite: Law 359 and 362, or former Law 360. (Choice of Paper or Examination) (Spring—evening)

523 **Court Review of Patent Office Decisions** (2) Dunner

Procedure and procedural law involved in appealing to the U.S. Court of Customs and Patent Appeals and the U.S. District Courts from administrative decisions in the U.S. Patent Office. Designed to provide an exhaustive step-by-step procedural progression through *ex parte* and *inter partes* patent and trademark appeals. Emphasis on the forms used in the many motions and proceedings before the U.S. Court of Customs and Patent Appeals and the District Courts required to perfect an appeal. Attendance at and critique of actual court proceedings. Introductory material includes administrative appeals before the U.S. Patent Office Board of Appeals. Prerequisite: Law 359 and 362, or former Law 360; or the equivalent in experience. (Examination) (Fall—evening)

524 **Chemical Patent Practice (2)** White

Seminar covering patent application preparation, prosecution, appeals, and licensing which are peculiar to chemical patent practice. Prerequisite: Law 359 and 362, or former Law 360; or comparable experience in the practice of patent law. (Examination) (Fall—evening)

525 **Copyright Law** (2) Cary

Historical background; formalities and essentials in securing a copyright; subject matter of copyright; remedies; international aspects of copyright under Berne Union, Universal Copyright Convention, Inter-American Convention; copyright licensing and performing rights societies. (Examination) (Spring—evening)

526 **U.S. Trademark Selection, Use, Protection, and Franchising** (2) Leeds

(Formerly U.S. and International Trademark Practice)

Registerability and enforcibility of trademarks and tradenames in the United States. Procedural and substantive law necessary to advise as to what names and marks are registerable in the United States; the detailed procedure to be followed before the U.S. Patent Office in obtaining federal registration; use of trademarks including licensing and franchise arrangements. Prerequisite: Law 329. (Examination) (Fall—evening)

527 **Advanced Topics in Patent Law** (2) Harris

Multidisciplinary consideration in depth of current industrial-intellectual property problems; licensing and protection of industrial property; uses and abuses of patents; governmental regulation; protection and transactions abroad; international treaties and arrangements; role of patents, trademarks, and trade secrets in business; economic and social functions of patents, trademarks, and copyrights. Students are exposed to pertinent source materials, professional research methods and techniques. Opportunity for oral presentation and discussion of term papers prior to submission is provided to encourage instructional dialogue among students and the investigation and analysis of issues. Prerequisite: Law 359 and 362, or former Law 360; or the equivalent in experience. (Research Paper) (Spring—evening)

529 **Research in Patent, Trademark, and Copyright Law** (2) Har

Prerequisite: Law 417, 527, and related courses; and a *B* average. Requ in writing, with proposed outline of topic of research, must be submit to the Dean at least one month prior to registration day. Work must completed within the semester and paper submitted not later than last d of classes. Graduate students may repeat this course once for credit w the approval of the Dean. (Research Paper) (Fall and spring)

Master of Laws candidates in the area of Patent and Trade Regulation Law wh have not taken the following courses or their equivalent as part of a Juris Do tor or Bachelor of Laws program should include them in their Master's program.

329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
359 *Patent Law*
362 *Patent Office Practice*

OTHER RELATED COURSES

412 *Food and Drug Law*
417 *Seminar: Trade Regulation*
427 *Legal Aspects of International Business Transactions*
431 *Government Procurement Law*
491 *Science Policy Formulation*
492 *Seminar: Science and the Legal Process*
493 *Intergovernmental Aspects of Technological Change*
541 *Seminar: European Common Market*
562 *Income Taxation of Foreign Business and Investment*

INTERNATIONAL LAW AND COMPARATIVE LAW

Faculty Advisers: International Law—W.T. Mallison; Comparative Law— J.M. Albert

531 **International Law of Air and Space** (2) Dembling

Study of the development of international law relating to the use of air space and outer space; analysis of air and space treaties in force; the role of various intergovernmental and nongovernmental international organiza- tions; consideration of special problems such as liability resulting from space activities, space technology and arms control, and pollution and contamination of outer space; earth resources, sensing, etc. (Research Paper) (Fall—evening)

532 **International Law of the Sea** (2) Muys

International and domestic law affecting the allocation of authority over ocean space. Problems concerning internal waters, territorial seas, the high seas, contiguous zones, and the continental shelf; the impact of ad- vances in ocean science technology on ocean resource law; freedom of the sea, maritime safety, and related subjects. (Examination) (Spring— evening)

533 **Legal Regulation of International Coercion** (2) Mallison, Jabo

Process of legal decision during war and at times when expectations of violence are high—contemporary international law of war and coercive

measures short of war, such as limited naval blockade; legal aspects of modern methods of coercion—economic, political, psychological, and military; limited war and modes of preventing "escalation" to total war; regulation of hostilities including protection of war victims, civilian persons, and prisoners of war; war crimes and punishment; problems concerning weapons of mass destruction; and problems of transforming coercion situations to minimum order ones. (Research Paper) (Fall—day)

535 **Negotiation: Concepts and Techniques** (2) Ramundo, Moss

Role of the lawyer and policy maker (client) in private, intragovernmental, and international negotiations; negotiations in private practice and governmental operations; achievement of consensus among contentious parties; negotiating techniques, including effective use of the "fallback"; gaming exercises in the actual conducting of negotiations, with practical work in the preparation of claim letters, agency and national positions, and negotiating instructions. (Writing Assignments) (Spring—evening; summer 1974)

536 **Diplomatic and Consular Law and Practice** (1) Mitchell

Development of diplomatic and consular relations between nations; legal rights, privileges, functions, and immunities of diplomatic and consular personnel; extent of immunity from jurisdiction of foreign government missions and representatives; problems of taxation affecting foreign government missions and personnel. (Research Paper) (Spring—evening)

537 **The International Law of Human Rights** (2) del Russo

Theory of fundamental freedoms from its philosophical to its legal formulation in the American and French Revolutions, the individual, vis-a-vis, the State, human rights as rights against the national government, the emerging of the individual in the law of nations as a subject of rights and duties, the individual as subject of international concern, social and political forces stressing the need for international recognition and protection of human rights, the setting of human rights standards. The Universal Declaration and its influence over the law of nations, critical assessment of the work of the UN in the human rights field, regional approach to the international protection of human rights, analysis of the case law of the European Convention, human rights in the Inter-American system, state sovereignty and the international protection of human rights, a comparative approach to human rights' protection at the national level, due process and freedom of speech in light of different legal systems. (Research Paper) (Spring—day)

540 **Choice of Law and Forum in International Controls** (2) Delaume

(Formerly Comparative Conflict of Laws and Transnational Legal Problems)

Adjudicatory jurisdiction, recognition and enforcement of foreign judgments in England and the Common Market countries; choice of forum clauses; transnational commercial arbitration; the Convention on the Settlement of Investment Disputes between States and Nationals of Other States; sovereign immunity; international judicial assistance; proof of foreign law; transnational contracts and stipulations of applicable law. Prerequisite: Law 309. (Research Paper) (Summer 1974)

541 **Seminar: European Common Market** (2)

Analysis of treaty establishing European Economic Community; institutions of EEC and of member states and the internal law of member states

as they affect doing business in EEC; series of problems arising out of tablishing and operating business with and within EEC. Background international law and antitrust law desirable. (Research Paper)

542 **Seminar: International Technical and Economic Assistance** (2)

Technical and economic assistance activities of the United States, United Nations, and specialized agencies; problems of law, policy, gram, and administration; development planning; public and private tra actions and institutions involving technical or economic assistance. search Paper)

546 **Soviet Law** (2) Ramund

Concept of "socialist legality"; legal relationship of individual to state a other participants in Soviet society; role of Party in Soviet legal syste Soviet philosophy of law; state (constitutional) law: Soviet federa governmental apparatus, rights and obligations of citizenship; crimi law; property law; labor law; selected topics in civil law and proced international law. (Choice of Paper or Examination) (Fall—evenin

Hsi

547 **Chinese Law** (2)

Emphasis on the legal system of Communist China; analysis of the co stitutional law of the People's Republic of China, including general pr ciples, state structure, and rights and duties of citizens; a brief survey the administration of justice—courts, procuratorates, and lawyers; ma riage law; land law; counterrevolutionary act and other criminal statute principles of civil law; Communist Chinese concept of international law (Research Paper)

Liebesny

548 **Law of the Near East** (2)

Law of the Arab countries, Turkey, and Iran, including basic principles o Islamic law, analysis of the present day codes, and investigation of the Western influences on laws of these countries. (Examination) (Sprin —evening)

Master of Laws candidates in the area of Public International and Comparative Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

302 *Admiralty*
304 *United Nations Law and World Order*
305 *International Law and World Order*
307 *Comparative Law*
309 *Conflict of Laws*

OTHER RELATED COURSES

427 *Legal Aspects of International Business Transactions*
494 *Use and Control of Atomic Energy and Space Technology*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
521 *International and Comparative Patent Law*
562 *Income Taxation of Foreign Business and Investment*

TAXATION

Faculty Advisers: J.R. Hambrick, D.B. Weaver

551 **Taxation—Partnerships and Subchapter S** (2) Weaver

Income tax problems of partnerships and tax-option corporations (Subchapters K and S of the Internal Revenue Code of 1954). Prerequisite: Law 336. (Examination) (Spring—evening)

553 **Seminar: Estate Planning** (2) Weaver, Speiller, Horowitz

Study of the effective disposition of wealth by inter vivos gift and testamentary transfer; emphasis on income, estate, and gift tax considerations; use of the trust form in the transfer of wealth; use of insurance and jointly held property as part of the estate plan; planning for the continuation or disposition of the client's business interests. Preparation of an estate plan, with supporting documents is the major project for the course. Prerequisite: Law 325, 326, 336, and 338. (Problem Assignments) (Spring—evening; summer 1974)

555 **Taxation—Special Corporation Problems** (2) Libin

Detailed study of the principal federal tax benefits of the corporate form of doing business. Consideration of problems involved in the tax planning of the corporate structure and corporate operation, including the tax definition of a corporation, the special deductions available to corporate payers, the compensation of the corporate executive and employee, the debt-equity question, the accumulated earnings tax, the personal holding company tax, multiple corporations, and consolidated returns. Survey of the types of corporations receiving special treatment under the Internal Revenue Code, such as financial institutions, real estate investment trusts, regulated investment companies, cooperatives, and small business corporations. Prerequisite: Law 340. (Research Paper) (Spring—evening)

557 **Taxation—Exempt Organizations** (2) Chabot, Hopkins, Myers

Tax-exempt organizations: policy and practice of preferred tax treatment for selected organizations and gifts to them. Statutes, regulations, and IRS practice; legislative origins, judicial interpretations, and policy consideration. Tests of qualification, disqualification, and limited tax preference. Mechanics of securing and retaining exemption; qualified exemption; unrelated business income; private inurement, political activity. Denial or loss of exemption. Return and reporting requirements. Comparative tax treatment of nonexempt and nonprofit organizations. Special sanctions with respect to private foundations, managers, and donors for improper, excessive, or prohibited activities. Enrollment may be limited. Prerequisite: Law 336. (Examination) (Fall and spring—evening)

558 **Taxation—Real Estate and Income** (2) Tucker

The effect of income taxes on the real estate market and real estate transactions: sales and exchange of real estate interests; various entities for the ownership and development of real estate; the impact of taxes on the landlord and tenant; the impact of taxes on the mortgagor and mortgagee, including the choice of financing techniques, such as the sale-leaseback; depreciation, amortization, and obsolescence; basis and basis adjustments; and casualties and other involuntary conversions. Prerequisite: Law 336. (Examination) (Spring—evening)

559 **Taxation—Oil and Gas** (2) Hambri

Application of federal income tax law to producing segment of oil a gas industry. Classification of interests; treatment of exploration and velopment expenditures. Depletion allowance and concept of "econo interests." Sales vs. "leasing" transactions. Organization problems. P requisite: Law 336. (Examination) (Spring—evening)

560 **Taxation—State and Local** (2) Fie

Taxation by state and local governments; problems of real and perso property taxation, sales and use taxes, business and personal inco taxes. Limitations on taxation of interstate commerce. Congressio problems. Prerequisite: Law 336. (Choice of Research Paper or Exa nation) (Spring—evening)

562 **Income Taxation of Foreign Business and Investment** (2) Hambri

The provisions and policies of the federal income tax law applicable foreign income, including considerations affecting the choice of metho of engaging in foreign business and investment, treatment of contro foreign corporations, allocation of income in foreign commerce, cre for foreign taxes, principles and trends of U.S. tax treaties. (Examinatio

564 **Seminar: Special Problems of Tax Policy** (2) Field, A. Sing

Intensive study of selected aspects of the tax structure with primary a tention given to the federal income tax. Problem areas are reviewed pr marily from the standpoint of tax policy, including legal, economic, s cial, and practical considerations. Alternative solutions, including cur rent legislative proposals, are examined. Prerequisite: Law 336, 340 (Research Paper) (Fall—evening)

567 **Seminar: Tax Practice and Procedure** (2) Kapp, Troyer, Yuro

Review of the major areas of tax practice, including organization of pr Internal Revenue Service, legislation, administrative regulations, tax plan ning, tax rulings, tax audit, settlement procedures, claims for refund, tax collection processes, criminal tax practice, and ethical problems in tax practice. Preparation of various documents is required. Prerequisite: 5 semester hours of taxation, including Law 336. (Problem Assignments) (Fall and spring—evening)

568 **Seminar: Federal Tax Litigation** (2)

Choice of forum. Conduct of civil tax cases: trial practice in the Tax Court, the District Courts, and the Court of Claims; appeal practice in the Courts of Appeals and on certiorari to the Supreme Court; analysis and drafting of pleadings, motions, and briefs; oral argument; settlements and stipulations of fact. Comparative responsibilities and procedures of IRS and of the Department of Justice for litigation control. Prerequisite: Law 567. (Writing Assignments)

Master of Laws candidates in the area of Taxation who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

336 *Taxation—Federal Income*
338 *Taxation—Federal Estate and Gift*
340 *Taxation—Federal Income, Corporations and Shareholders*
351 *Law and Accounting*

OTHER RELATED COURSES

403 *Public Economic Policy and the Law*
404 *Securities Regulation*
424 *Business Planning*
427 *Legal Aspects of International Business Transactions*

URBAN LEGAL STUDIES

Faculty Advisers: R.S. Kuhn, M. Pock, D.P. Rothschild

571 **Land Development Planning** (3) McGrath*

Selected problems in urban and regional planning: applications of zoning, urban renewal, and special programs available for the implementation of development plans. (Examination and Paper) (Spring—evening)

575 **Community Economic Development** (2) Stevenson

A substantive study of the organizational, financial, and tax-planning aspects of nonprofit, cooperative, and small business organizations. Problems illustrating some of the legal considerations of a nonprofit organization and a small business. Consideration of the problems of economic development and current efforts to stimulate it. Prerequisite: Law 312, 336. (Problem Assignments) (Spring—day)

579 **Clinical Studies in Urban Law** (2 or 3) Sirulnik

Service in the Community Legal Clinic under the supervision of the Director of the Clinic. The Clinic helps Washington, D.C., area agencies and community groups with the problems of the inner-city and Washington's black and Spanish-speaking residents. Students are assigned to specific projects, such as providing legal counsel to the Director of the Neighborhood Development Center in Anacostia; investigating job discrimination complaints, including working with volunteer attorneys suing for relief; assisting in the preparation and conduct of a class action to remedy alleged police misconduct in a nearby black community; analyzing pending legislation and preparing testimony for an organization of ex-convicts; and working with urban planning students in preparing proposals for construction of housing and community facilities on surplus federal lands in Southeast Washington. Students who perform 10 hours' service each week for the semester receive 2 semester hours of credit; students who perform 15 hours' service each week for the semester receive 3 semester hours of credit. May be repeated for credit not to exceed 6 semester hours. This course may not be taken at the same time as Law 345, 487, or any litigating activities in Law 346. The grade of *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring)

Descriptions for the other courses in this area (listed below) appear elsewhere n "Advanced Courses."

451 **Federal Programs in Urban Poverty** (2)

458 **Housing the Poor** (2)

459 **Problems of the Consumer** (2 or 3)

501 **Land Development Law** (3)

*Dom Charles McGrath, Jr., is Professor of Urban Planning and Chairman of the Department f Urban and Regional Planning in the School of Government and Business Administration.

505 **Intergovernmental Relations I** (2)

506 **Intergovernmental Relations II** (2)

560 **Taxation—State and Local** (2)

Master of Laws candidates in the area of Urban Legal Studies who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program

349 *Local Government Law*
445 *Labor Relations in State and Local Governments*
477 *The Police and the Community*

OTHER RELATED COURSES

460 *Current Problems in Civil Rights*
475 *Law and Criminology I: Search for the Causes of Criminal Behavior*
476 *Law and Criminology II: Society's Responses to the Criminal Offender*
487 *Child Advocacy*
592 *Seminar: Constitutional Law*

OTHER ADVANCED COURSES

Miller

590 **Population Control and the Law** (2)

Consideration of the concept of an "optimum" population through examination of existing statutes which encourage or discourage population growth; relevant Supreme Court cases; international policies of a public law nature leading to population stabilization; and proposed legislation (Research Paper)

Zweben

591 **Legislative Drafting** (2)

Advanced instruction and practice in legislative drafting; overview of legislative process with emphasis on legislative drafting. Enrollment limited to 30 students. (Problem Assignments) (Spring—evening)

592 **Seminar: Constitutional Law** (2) Dixon, H. Green, Silard

Group study of contemporary problems in constitutional law; process of constitutional litigation; problems of effectuating constitutional guarantees. Enrollment limited to 36 students. (Research Paper) (Fall—day)

D. Green

593 **Seminar: American Legal History** (2)

From the outbreak of the Revolution at Lexington and Concord to the death of John Marshall. An examination of men, events, and movements significant in the unfolding of our laws and legal institutions in this formative period of our national life, including a critical examination of the place of the lawyer in a revolutionary age. Comparison of the role of the lawyer during the politically and socially unsettled time of Marshall with the role of the lawyer in today's troubled scene. Each member of the seminar presents the results of his research and thought either by an oral or by a written report. The grade of *CR* (Credit) or *NC* (No Credit) is given for this course. (Problem Assignments) (Fall—as arranged)

Park

594 **Seminar: Privacy** (2)

Detailed study of civil interests in freedom from intrusion, with problems including government surveillance, private investigations, psychological

testing, state regulation of marital relations, and conduct restrictions of public institutions. Discussions based on a small number of cases, selections from the literature of psychology and psychoanalysis, legal readings, and student research memoranda and papers. Students should have a substantial academic background in at least one of the following areas: psychology, sociology, philosophy, or civil rights law. In addition to the research paper, weekly memoranda will be required. Enrollment limited to 24 students. (Research Paper)

595 **Seminar: Supreme Court Practice** (2) Gressman

Study of the jurisdiction, practice, and procedure of the Supreme Court of the United States. Certiorari and appeal; the Court's Rules of Practice; how to prepare petitions and jurisdictional statements; the internal operation of the Supreme Court; other related aspects of Supreme Court practice, such as bail and stay applications, use of extraordinary writs, motions practice, oral argument, and briefing; *in forma pauperis* procedures. Students will prepare documents used in Supreme Court practice—petitions for certiorari, jurisdictional statements, and opposing briefs and arguments—using the actual conference list of cases pending before the Court. (Research Paper) (Spring—day)

597 **Independent Studies (arr.)** Staff

Limited to teaching fellows. The proposed program of study must be submitted to a faculty member in writing and approved prior to the beginning of the semester. May not be elected for more than 12 semester hours of credit. (Fall and spring)

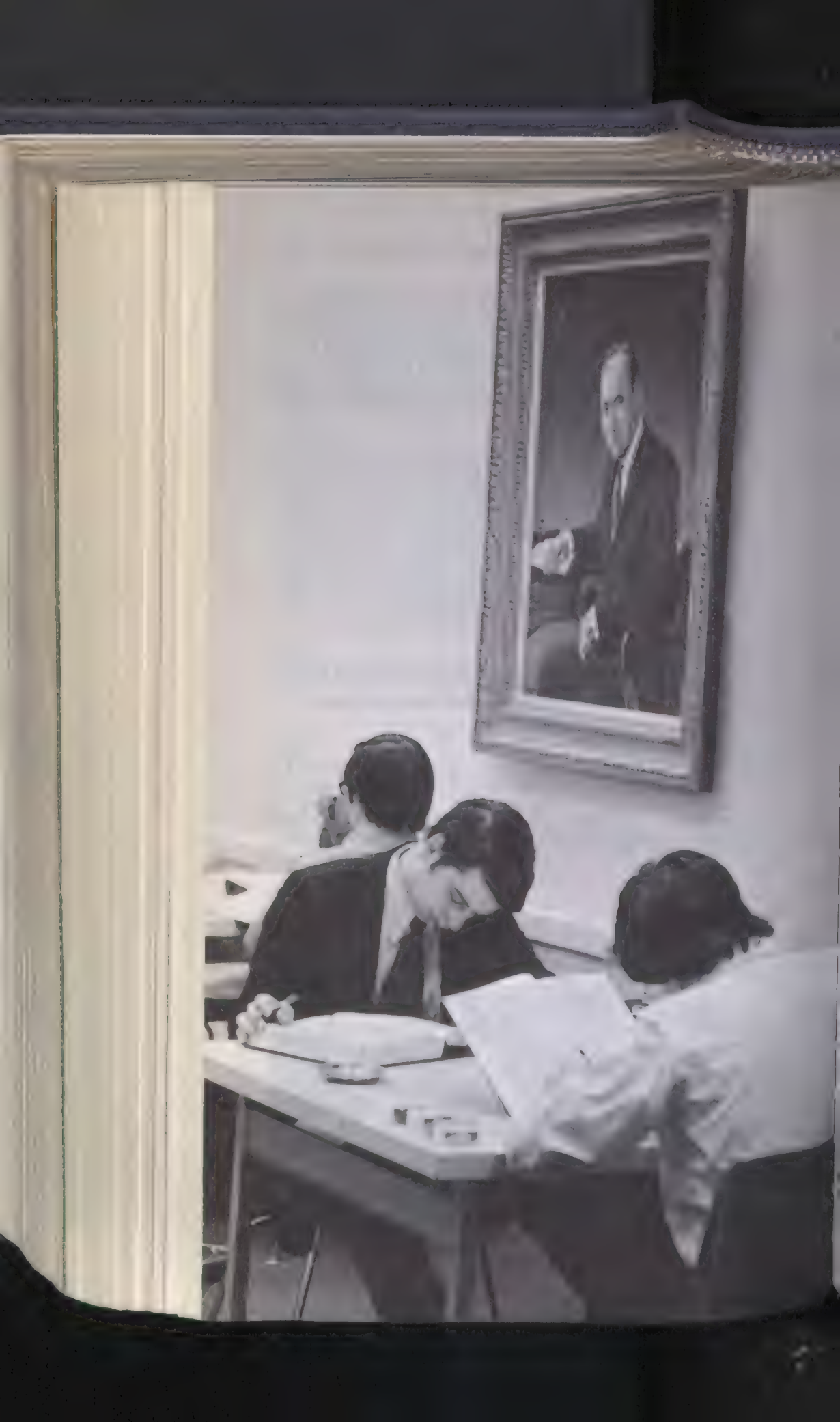
598 **Research in Public Law** (2) Staff

Registration limited to students with at least a *B* average who have had a seminar or comparable course in field of proposed research. Students are responsible for obtaining an adviser from the full-time faculty who is willing to sponsor their research. This adviser's name must be submitted to the Dean at registration. Work must be completed within the semester. Students may repeat this course once for credit with the approval of the Dean. (Research Paper) (Fall, spring, summer)

599–600 **Thesis** (2–2)

It is recommended that students not register for both sections in one semester. (Fall, spring, summer)





SPECIAL PROGRAMS IN RESEARCH AND INSTRUCTION

CENTER FOR ADMINISTRATIVE JUSTICE

Director Milton Carrow

THE CENTER FOR ADMINISTRATIVE JUSTICE was created by the Board of Governors of the American Bar Association in association with George Washington University and is funded by the American Bar Endowment. Its basic purpose is to provide educational, research, and archival resources for an estimated 350,000 lawyers and others engaged in the administrative law field, both within and outside government.

ENVIRONMENTAL LAW PROGRAM

Director A.W. Reitze

The Environmental Law Program seeks to provide both academic and clinical experience in the environmental law field. The program is predicated on an exchange of information and experience between the academic community and the world of the practicing attorney. The result is a forum for presentation, discussion, and implementation of legal avenues to cope with the critical environmental issues of the present and future generations. These goals are achieved through courses, seminars, research projects, and clinical activities.

GOVERNMENT CONTRACTS PROGRAM

Director G.J. Ginsburg

A comprehensive government contracts program provides continuing instruction for industry and government personnel in this field and a program of courses leading to the Master of Laws degree in Government Procurement Law. The program includes (1) short seminars, (2) one-week courses in advanced problems in the field, (3) an annual institute treating a problem of contemporary importance, (4) an annual conference in a major area, (5) compilation of materials for use in current courses, (6) publication of a series of monographs treating special problems in the field, and (7) special research projects.

INSTITUTE OF LAW, PSYCHIATRY, AND CRIMINOLOGY

Director T.F. Courtless, Jr.
Co-director Leon Yochelson

The Institute of Law, Psychiatry, and Criminology draws upon the insights and techniques of the behavioral sciences in areas of mutual concern to law and its sister disciplines, with special emphasis in the fields of forensic psychiatry and criminology.

INTERNATIONAL LAW PROGRAM

Director W.T. Mallison

The objective of the International Law Program is to provide a better understanding of how decisions in international law are actually made and the improvements which are needed in decision-making, sanctions processes, and accompanying legal institutions to promote the extension of the rule of law in the world community while considering the relationship between domestic and international law. The Program also includes the international aspects of business transactions and economic development. The objectives of the Program are implemented through course work and seminars for both J.D. and Post.-J.D. degree students and through research and writing in the field.

LAND USE MANAGEMENT AND CONTROL PROGRAM

Director J.M. Brown

The social, economic, technological, political and legal interrelationships generated by the fact that land is a basic, limited-supply natural resource, capable of being subjected to differing but concurrent public and private uses, raise a growing number of issues involving management policy and control measures which are of critical concern to the future of the nation. The Land Use Management and Control Program, through a combination of academic, clinical, and game-simulation processes, seeks to provide an understanding of existing and pending problems, needs, means, and opportunities for solution with respect to this developing area of national concern.

LAW, SCIENCE, AND TECHNOLOGY PROGRAM

Director H.P. Green

The Law, Science, and Technology Program deals with the reciprocal relationships between law and science, providing courses, seminars, research studies, and publications to equip the legal profession to deal more effectively with the social, economic, political, and legal consequences of the nation's present massive commitment to scientific progress.

PATENT LAW PROGRAM

Director Irving Kayton

The Patent Law Program is designed for students in the J.D. and Post-J.D. degree programs whose intentions are to specialize in the practice of patent law.

During the past eight years an organized program has been developed to offer as complete and as integrated collection of courses in patent law as possible. The course offerings in patent law now total 17 semester hours, far more than any other law school in the United States. In addition, courses in trademark and copyright law are also available (see the "Patent and Trade Regulation Law" area of specialization in the "Advanced Courses" section of this catalogue for a complete list and detailed description of the patent law courses offered). The object of the Patent Law Program is to provide the student with a concentration in patent law at a level of specialization and maturity which will enable him to advance more rapidly in this field.





THE GEORGE WASHINGTON LAW ASSOCIATION

Director of Law Alumni Relations Clifford A. Dougherty, J.D.(W.H.) 1964

THE GEORGE WASHINGTON LAW ASSOCIATION was founded in 1912 and has been affiliated with the General Alumni Association since 1926. Its purposes as stated in the constitution are to promote high standards of legal education, to keep the alumni of the school in close touch with one another, especially with members of their own classes, to gather and publish at intervals information as to the whereabouts and activities of these alumni, and to further the interests of the school.

Eligible members are those who have matriculated in the school or National University and have left in good standing, and any member or former member of the faculty of the school. Active members are those eligible members who are current contributors to the Law Annual Support Program of the University and life members of the George Washington Law Association.

The Association plans publication periodically of the Law Alumni Directory. Law alumni are urged to keep the Alumni Office informed of their whereabouts so that directory information can be kept up to date.

The Law Alumni Office is in the University Library, 2130 H Street, N.W., Washington, D.C. 20006.

OFFICERS FOR 1973–74

President.—F. Elwood Davis, LL.B. 1943; Washington, D.C.
First Vice President.—Marion Edwyn Harrison, LL.B. 1954, LL.M. 1959; Washington, D.C.
Second Vice President.—Richard A. Ward, B.A. 1961, J.D.(W.H.) 1965; Washington, D.C.
Third Vice President.—Betty Ann Thompson, B.A. 1946, LL.B. 1948; Arlington, Va.
Secretary.—Michael P. Bentzen, LL.B. 1964; Washington, D.C.
Treasurer.—Donald L. Mooers, LL.B. 1963; Washington, D.C.
Executive Committee:
Joseph D. Bulman, LL.B. 1931; Washington, D.C.
Jacob Burns, LL.B.(W.D.) 1924; New York, N.Y.
James C. Cacheris, J.D.(W.H.) 1960; Alexandria, Va.
Lawrence R. Caruso, B.A. 1949, J.D. 1950, LL.M. 1953; Washington, D.C.
Donn E. Cassity, B.A. 1950, J.D. 1953; Salt Lake City, Utah
Donald H. Ching, LL.B. 1953; Honolulu, Hawaii
Fred H. Daly, J.D. 1966; Akron, Ohio

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THE UNIVERSITY

HISTORY AND ORGANIZATION

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "that persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the

buildings of the University were situated along H Street between Thirteenth a Fifteenth Streets.

During the last half century the University's present plant has been develope in that section of the old First Ward familiarly known as "Foggy Bottom between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue The area is not without its reminders of historic interest to the University. Pres ident Monroe, who signed the Charter, lived at 2017 Eye Street. The first Pres ident of the Board of Trustees, the Reverend Obadiah B. Brown, was for fift years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine and Health Sciences, Engineering and Applied Science, Education Government and Business Administration, Public and International Affairs; the College of General Studies; the Division of University Students; the Summer Sessions; and the Division of Experimental Programs.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools. The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the United States Information Agency, the Department of the Interior, the Department of State, the General Services Administration, the National Academy of Sciences, and the Kennedy Center for the Performing Arts.

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B.A. 1950, University of North Carolina at Chapel Hill; LL.B. 1955, S.J.D. 1969, Harvar
University

George Walter Shelhorse, *Professorial Lecturer in Law*
J.D. 1951, George Washington University

John Silard, *Professorial Lecturer in Law*
B.A. 1949, LL.B. 1952, Columbia University

Herbert Myron Silverberg, *Associate Professorial Lecturer in Law*
B.A. 1961, LL.B. 1968, University of Pennsylvania

Andrew Warren Singer, *Professorial Lecturer in Law*
B.S. in Econ. 1963, University of Pennsylvania; LL.B. 1966, Harvard University

Richard Gus Singer, *Associate Professorial Lecturer in Law*
B.A. 1963, Amherst College; J.D. 1966, University of Chicago; LL.M. 1970, Columbia Uni
versity

Eric Scott Sirulnik, *Visiting Associate Professor of Law; Director of the*
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B.A. 1965, Franklin and Marshall College; J.D. 1968, Boston University; LL.M. 1970, George
Washington University

Dudley Graham Skinker, *Clerk of the Trial Practice Court*
LL.B. 1940, George Washington University

Daniel Lawrence Skoler, *Professorial Lecturer in Law*
LL.B. 1952, Harvard University

John William Snow, *Professorial Lecturer in Law*
B.A. 1962, University of Toledo; Ph.D. 1965, University of Virginia; J.D. 1967, George
Washington University

William Marvin Speiller, *Professorial Lecturer in Law*
B.S. 1950, LL.B. 1952, Syracuse University; LL.M. 1953, Harvard University

Thomas Henry Stanton, *Professorial Lecturer in Law*
B.A. 1965, University of California, Davis; M.A. 1967, Yale University; J.D. 1970, Harvard
University

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* On sabbatical leave spring semester 1975.

*James Edward Starrs, *Professor of Law*
B.A., LL.B. 1958, St. John's University, New York; LL.M. 1959, New York University

Alexander Louis Stevas, *Professorial Lecturer in Law*
B.A. 1949, LL.B. 1951, George Washington University

Russell Bennett Stevenson, Jr., *Associate Professor of Law*
B.M.E. 1964, Cornell University; J.D. 1969, Harvard University

Theodore Tannenwald, Jr., *Professorial Lecturer in Law*
B.A. 1936, Brown University; LL.B. 1939, Harvard University

Robert Max Tobias, *Professorial Lecturer in Law*
B.A. 1965, M.B.A. 1967, University of Michigan; J.D. 1969, George Washington University

Thomas Alfred Troyer, *Professorial Lecturer in Law*
B.A. 1955, Harvard University; J.D. 1958, University of Michigan

Stefan Franklin Tucker, *Professorial Lecturer in Law*
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B.A. 1943, Ohio Wesleyan University; J.D. 1948, Case Western Reserve University

Glen Earl Weston, *Professor of Law*
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B.A. 1948, M.S. 1949, Kalamazoo College; J.D. 1958, George Washington University

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B.A. 1961, LL.B. 1964, Howard University

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John Jesse Yurow, *Professorial Lecturer in Law*
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Murray Zweben, *Professorial Lecturer in Law*
B.S. 1952, M.S. 1953, State University of New York at Albany; LL.B. 1959, George Washington University

Summary of Registration, Fall Semester 1973-74

	1st year	*2nd year*	*3rd year*	*4th year*	*Graduate*	*Other*
Day	375	346	289	.....	48	20
Evening	124	104	85	84	199	67

Total: 1,741

* On leave of absence fall semester 1974; on sabbatical leave spring semester 1975.
† On sabbatical leave spring semester 1975.



APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of The George Washington University as soon after order is restored as is practicably possible.

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

* Amended January 18, 1973.

(c) who disobeys general regulations of the University, or
(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

*The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

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NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

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SCHOOL OF MEDICINE AND HEALTH SCIENCES, Admissions Office, School of Medicine and Health Sciences

SUMMER SESSIONS CATALOGUE, Dean of the Summer Sessions

SCHEDULE OF CLASSES: FALL AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Asso
ciate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.
Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bach
lor of Science in Geodetic and Cartographic Science (B.S. in Geod. a
Cart.Sc.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master
Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.
Master of Forensic Sciences (M.Forens.S.), Master of Music (Mus.M.
Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers
Master of Science in Forensic Science (M.S. in Forens.S.), Master of Scienc
in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.
Bachelor of Science (B.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master
of Comparative Law (M.Comp.L.), Master of Comparative Law (American
Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil En
gineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S.
(E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Mas
ter of Engineering Administration (M.E.A.), Master of Science (M.S.), and
Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelor
of Science in Physical Education (B.S. in P.E.), Master of Arts in Education
(M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist
(Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business
Administration (B.B.A.), Bachelor of Science in Administration (B.S. in
Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.),
Master of Arts in Government (M.A. in Govt.), Master of Arts in Health
Care Administration (M.A. in H.C.A.), Master of Business Administration
(M.B.A.), Master of Public Administration (M.P.A.), Master of Science in
Administration (M.S. in Adm.), Master of Urban and Regional Planning (M.
of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care
Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration
(D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.) and
Master of Arts (M.A.)

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THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

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THE DIVISION OF UNIVERSITY STUDENTS, 1930

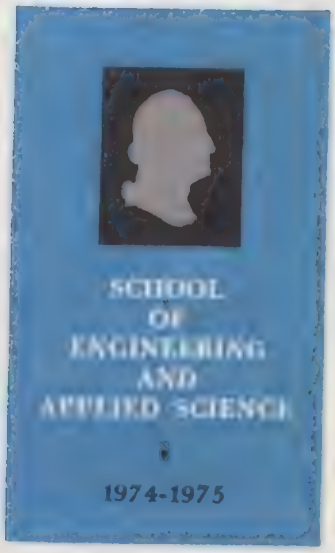
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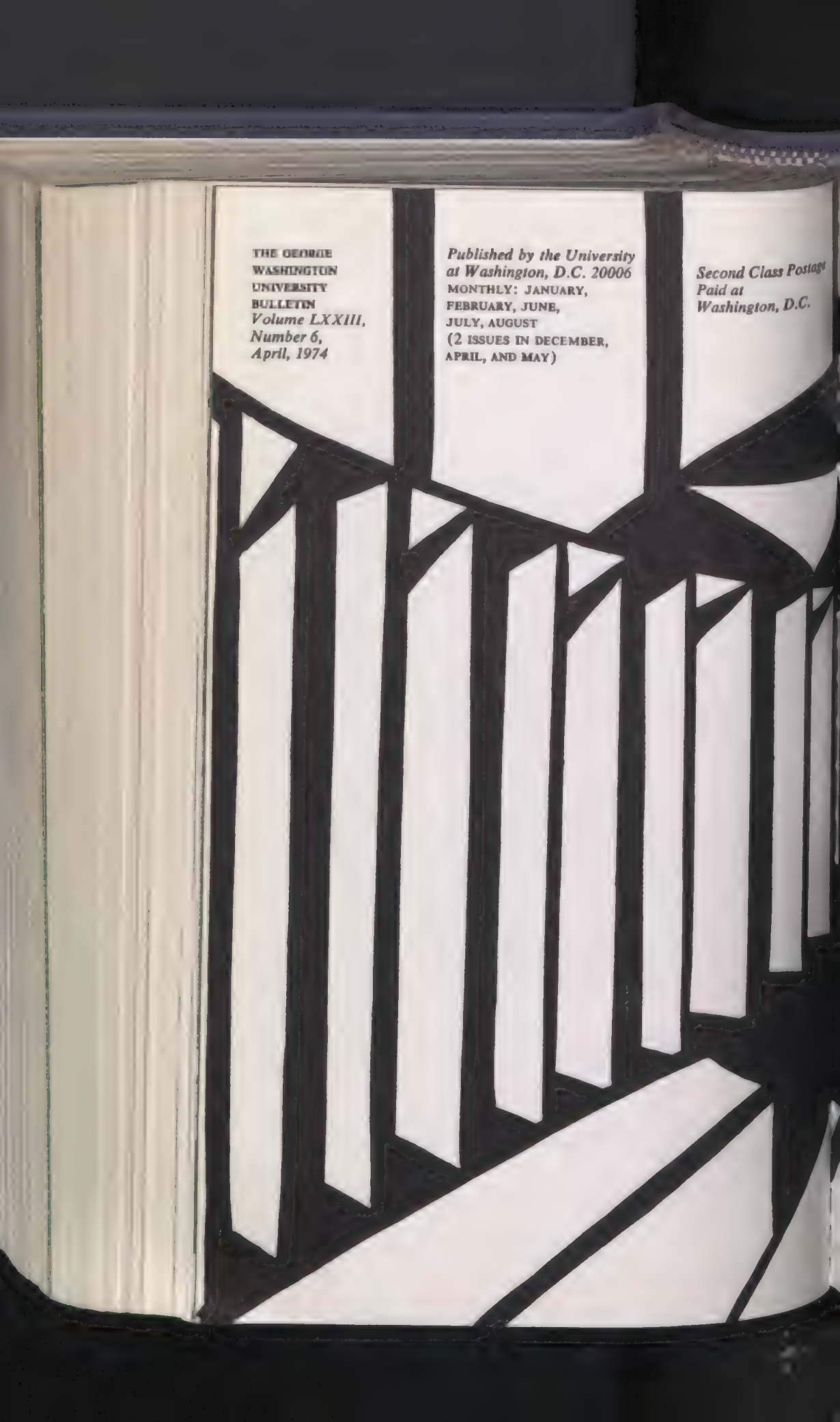
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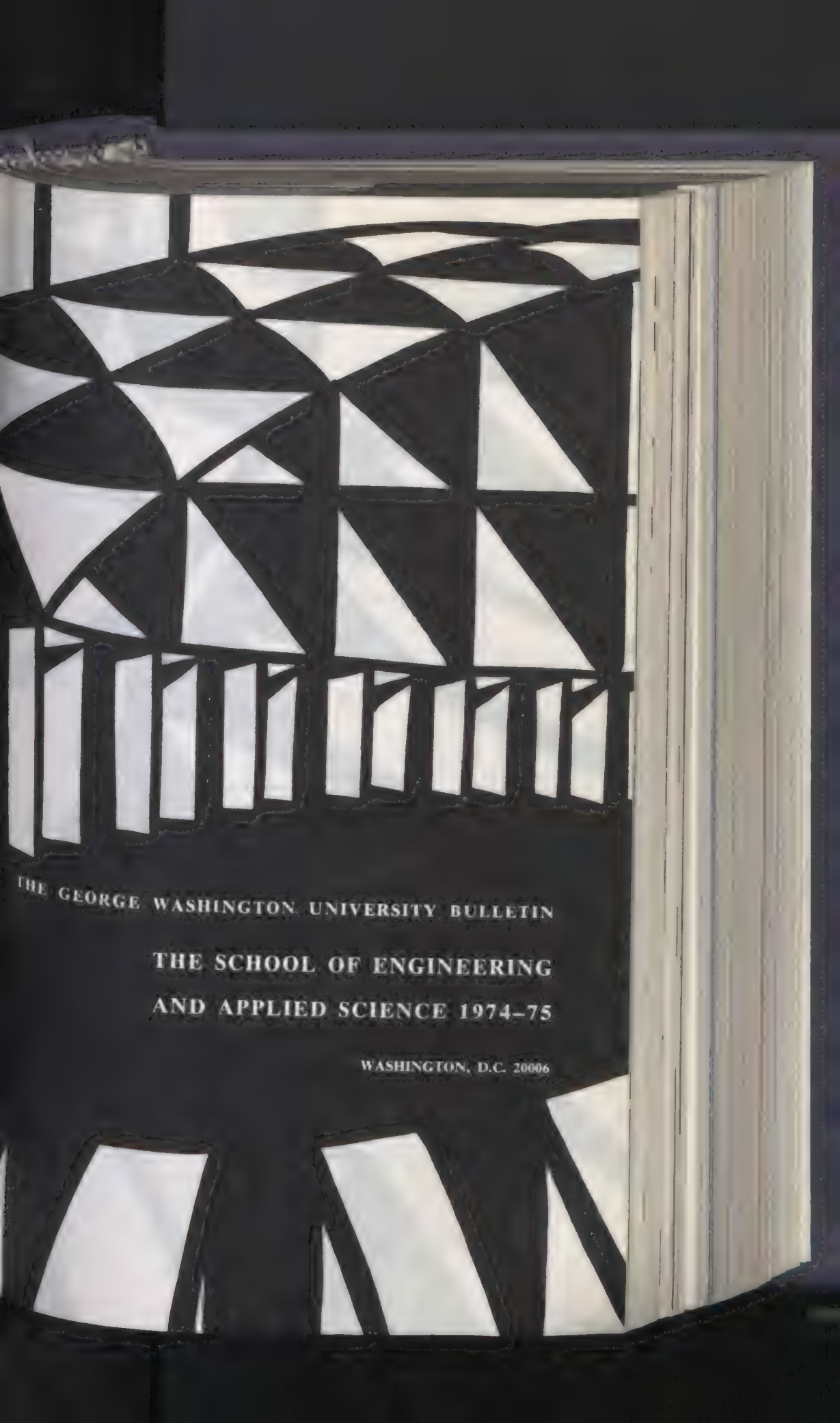


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THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE 1974–75

WASHINGTON, D.C. 20006



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THE CALENDAR 1974–75*

1974 FALL SEMESTER

August 26	Orientation for students from foreign countries *Monday*
August 27	Placement tests for entering students *Tuesday*
August 28	Advising for all students *Wednesday*
August 29–31	Registration—Tompkins Hall of Engineering *Thursday–Saturday*
	Application for February graduation due as part of registration
September 2	Labor Day (holiday) *Monday*
September 3	Classes begin *Tuesday*
November 1	Application for spring semester student financial aid due *Friday*
November 19	D.Sc. dissertations of February candidates due *Tuesday*
November 27	Thanksgiving recess begins after last class *Wednesday*
December 2	Classes resume *Monday*
December 2	Master's theses of February candidates due *Monday*
December 3	Last day of fall-semester classes *Thursday*
December 9–18	Examination period *Monday–Wednesday*

1975 SPRING SEMESTER

January 6	Orientation for students from foreign countries *Monday*
January 7–8	Advising for all students *Tuesday–Wednesday*
January 9–11	Registration—Tompkins Hall of Engineering *Thursday–Saturday*
	Application for May graduation due as part of registration
January 13	Spring-semester classes begin *Monday*
February 1	Application for 1975–76 freshman student financial aid due *Saturday*
February 17	Winter Convocation (holiday) *Monday*
March 1	Application for 1975–76 continuing and transfer undergraduate student financial aid due *Saturday*
March 8	Spring recess begins after last class *Saturday*
March 17	Classes resume *Monday*
March 18	D.Sc. dissertations of May candidates due *Tuesday*
April 1	Application for 1975–76 graduate student financial aid due *Tuesday*
April 4	Master's theses of May candidates due *Friday*
April 18	Last day of spring-semester classes *Friday*
April 24–May 3	Examination period *Thursday–Saturday*
May 1	Application for Summer Sessions student financial aid due *Thursday*
May 4	Commencement *Sunday*

* This calendar is subject to change.

1974

JULY

M	T	W	T	F	S
1	2	3	4	5	6
8	9	10	11	12	13
15	16	17	18	19	20
22	23	24	25	26	27
29	30	31			

AUGUST

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

SEPTEMBER

S	M	T	W	T	F	S
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TO ALL PROSPECTIVE STUDENTS:

The School of Engineering and Applied Science has been in continuous session since 1884, and offers programs of study leading to Bachelor's, Master's, and Doctor's degrees. Its prime objective is to educate the student so that he will have the precious asset of a well-trained mind which may be applied to the attainment of our many national objectives. In these changing times, it is necessary to search for quality. Students and faculty have the opportunity of assisting in the planning and implementation of educational programs. Examination is made periodically of the School's objectives and how they relate to those established by the Engineering Council for Professional Development (ECPD). Emphasis includes such items as the student's basic and advanced levels of education and his role in present and future society.

This catalogue describes the programs and requirements for undergraduate and graduate study in the School of Engineering and Applied Science and includes information on the Cooperative Education Program in Engineering and the Joint Institute for Acoustics and Flight Sciences (JIAFS).

The Cooperative Education Program in Engineering provides the undergraduate engineering student with the opportunity to obtain an enduring foundation in engineering education by combining academic learning with practical, first-hand experience in the student's chosen field of engineering. The student's earnings will help him pay for a major part of the cost of his education.

JIAFS was created by the joint efforts of the NASA-Langley Research Center and the School of Engineering and Applied Science. The education and research opportunities offered in the program combine the academic resources of George Washington University and the professional research resources and facilities of NASA-Langley Research Center to prepare qualified graduate students for careers in research, development, design, and teaching.

The School of Engineering and Applied Science is a professional school in a university comprised of eight degree-granting schools and colleges. The environment of the nation's capital is very favorable for the intellectual and cultural development of the student. The metropolitan Washington area contains the second largest concentration of research and development in the United States, and the engineering component of this activity is similarly extensive offering many employment opportunities to students after graduation.

The atmosphere of the School is one of serious-minded effort toward mature development. Being a small school, it recognizes the individual as the single most important element in the educational process. The student body, undergraduate and graduate, has a primary interest in design, research, development, and management in both scientific and engineering activities. Many alumni of the School are successfully engaged in all fields of engineering—in science, management, government, and education.

The philosophy of the School, which might be summarized as "education for creativity, not conformity," has through the years reflected the many subtle and profound changes in the engineering profession.

The faculty of the School and I look forward to providing a closer and more fruitful relationship with you. If you need additional information, please do not hesitate to call upon the Department Chairmen or me.

HAROLD LIEBOWITZ
Dean



THE STUDY OF ENGINEERING

THE MEANING OF ENGINEERING AND APPLIED SCIENCE

ENGINEERING IS A BROAD PROFESSION. Its responsibilities and activities extend into every aspect of industry and research, and into many fields of commerce and the arts. Engineers have faced and continue to face problems in the production and distribution of all types of manufactured products, including the design of mechanical, electrical, and chemical processes, of equipment, and of plants in which such products are made; in the design and construction of an infinite variety of structures such as bridges, tunnels, harbors, and dams; in aircraft design and construction, including complicated electronic equipment for control, guidance, and communication; in the operation of transportation systems; in the wide spectrum of activities existing in the automotive industry; in the missile and space programs; in the generation and transmission of power; in the modern phases of communication; in the control of traffic; in city planning; in public health and sanitation as it affects the environment; in energy resources and power; and in ventilation and refrigeration. This list of applications is far from exhaustive; it does indicate, however, that engineering is a broad profession in which there are many specialists.

THE RELATIONSHIP OF ENGINEERING AND SCIENCE

In any discussion of "engineering and applied science," it is important to emphasize the distinction between engineering and science. The President's Scientific Advisory Committee points out that the engineer and scientist each play an important role on a team. "The scientist is one who seeks to extend the boundaries of knowledge in his chosen field. The engineer has the task of combining the knowledge of science with his knowledge and awareness of the needs and limitations of human beings and of a human society to develop and create things for human use. . . . While scientists have uncovered the basic knowledge, it is the engineers who have created the tangible tools, materials, and products that have revolutionized our daily lives, our community living, and our national defense."

The work of engineers is a focal point at which scientific knowledge, the use of such knowledge as a service to society, financial material, human resources, and society's needs are interrelated. The engineer is concerned, therefore, with the means for operating a dynamic society. He must consider not only whether the knowledge that exists will enable him to create a workable product, but also how the product can be built, who will use it, and how such use will affect the environment in which it will operate.

THE PROFESSIONAL ENGINEER

Engineers are concerned with the quality and preservation of human life. Engineer, as the term is used in this catalogue and as it is commonly understood in our society, refers to the person who makes use of the advances of science and technology in an economically feasible manner for the benefit of society. This process is complex and challenging. Although the content of engineering curricula is certainly scientific, the engineer has not lost his sense of purpose in serving as an intellectual agent in the practical world. This responsibility of the engineer arises from the breadth of the implications of engineering for the whole of society as well as from the depth of the requirements for competence. Technology has radically rearranged human life in our time. There are many who believe that, although the threshold of space has been crossed, the union of medical and engineering practice has been achieved, and breakthroughs have been made in other areas, this impact of engineering on modern life is just a modest preview of the engineering of tomorrow.

ENGINEERING EDUCATION AND THE STUDENT

Rapidly changing and advancing engineering activity requires an education for the future based on fundamental principles of science useful in applications to a dynamic, advanced society. In the fields of engineering and applied science there is no substitute for demonstrated ability and competence to solve the problems faced. Without question, achievement in particular courses of study is important. Equally important, however, is the ability to analyze and interpret all the aspects of a problem, to formulate solutions, and to evaluate those solutions in the light of all available information. The attainment of this objective is the basis for undergraduate education. The undergraduate program of the School of Engineering and Applied Science is subjected to periodic evaluation and appraisal by the faculty.

The curricula of the School of Engineering and Applied Science are founded on one basic principle—to assist the student in preparing for a career in engineering and applied science. This philosophy requires that the student master the principles on which future practice will be based and that he receive an education centered on that meaningful junction between theory and practice so that throughout his professional life he can follow the many interests and opportunities that may develop.

It should not be assumed, however, that only the intellectual elite should consider the study of engineering and applied science. Engineering, like medicine, law, education, science, history, government, and other disciplines, requires scholars. But in any of these areas, even though the prospective student has not achieved high scholastic standing, if he is genuinely interested in the subject, he can probably find a place for himself. Those who are mod-

erately well-endowed with mental ability and who are interested and willing to work will find in engineering and applied science a rich and varied field of study which can lead to satisfaction and success. It is difficult to make generalizations in this area, but if a student has demonstrated an aptitude for mathematics, science, and English, he will probably find the work of engineers and the study of engineering and applied science satisfying and challenging. Innate intellectual curiosity and the desire to learn and to work hard are good indicators of success. College Board examinations may reveal the capacity to manage further study in mathematics and science and their applications to engineering. No school or college can "give" an education. It can offer only the opportunity to "get" an education. The George Washington University School of Engineering and Applied Science is a small school which provides an opportunity for close liaison with faculty members, as well as the opportunity to participate in matters of student concern—in organizations, by working on the magazine, and through other student activities. The School recognizes the individual as the most important element in the educational process.



THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

HISTORY

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE was organized October 1, 1884, as the Corcoran Scientific School of Columbian University and was situated in the University Building then at 15th and H Streets, N.W. The School was named in honor of William W. Corcoran, Trustee and President of the Corporation from 1869 to 1888. Day and evening courses were offered in Literature, Science, and Technology and led to the degrees of Bachelor of Science, Civil Engineer, Mechanical Engineer, and Mining Engineer. The School was among the first to accept women for degree candidacy in engineering.

In 1903 the Corcoran Scientific School, the School of Graduate Studies, and the Columbian College were merged into a single Department of Arts and Sciences. Engineering degrees were made graduate.

Administrative changes led to The Washington College of Engineering being initiated in 1905 as one of the several semi-independent undergraduate colleges of the University, each with its own Board of Trustees. The College provided instruction leading to undergraduate degrees in engineering and architecture.

In 1909 the name of the College was changed to the College of Engineering and Mechanic Arts, and the curricula were revised to give the student a thorough understanding of the theory underlying engineering practice. Emphasis was placed on the development of a knowledge of scientific principles upon which the student could build and by which he might solve new problems as they are met in practice.

The name of the School was changed again in 1914 to the College of Engineering and later to the School of Engineering. Architecture was dropped from the curriculum, and degrees were limited to the field of engineering. However, the primary emphasis upon principles rather than technology which had characterized the School since 1903 was continued and has remained to this day as one of the important distinguishing features of the School.

In 1962 the name of the School became the School of Engineering and Applied Science.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

The curricula in Civil Engineering, Electrical Engineering, and Mechanical Engineering are accredited by the Engineers' Council for Professional Development.

Undergraduate Study

THE UNDERGRADUATE PROGRAM is intended to provide a solid foundation in the basic principles, concepts, and techniques underlying engineering and applied science, on which the individual may build technical competence in a variety of areas as his professional career develops. It is preparation for a career in engineering or applied science, as it exists today and as it may develop in the future.

Undergraduate study is the formal beginning of a life-long continuing program of education. The School provides an environment that encourages and fosters the attitudes and disciplines essential to professional growth. The graduate, when he receives his Bachelor's degree, is prepared for productive work in his chosen field; he is also prepared for further development and progress, both formal and informal. The undergraduate curricula include courses in the humanities and social sciences to the extent necessary to develop a reasonable understanding and appreciation of these areas of knowledge.

Admission to the engineering program indicates that the student possesses at least minimum preparation and the probable capacity to meet the academic demands of this School. Since the School cannot predict either the student's response to the demands made on him or the program he should follow for his most effective development, the undergraduate program has been designed to offer a variety of experiences through which the student may find his own best path to maturity and growth in educational development.

The School is a place for learning; for experiencing adventures of the mind and of the hands; for the formulation, exchange, and exploration of ideas. During his undergraduate years the student is led to strengthen his skills in analysis and his talent for creative activity, through liberal use of project-type laboratory work. Independent thought and original ideas receive higher evaluation in the appraisal of student achievements, than the rote recital of information.

To provide the undergraduate engineering student with the opportunity to obtain an enduring foundation in engineering education by combining academic learning with relevant, real-world employment which provides practical, first-hand experience in his chosen field of engineering, the School of Engineering and Applied Science has a Cooperative Education Program in Engineering in which arrangements have been made with leading industrial and governmental organizations for student employment at prevailing salary rates. Every effort is made to place the student in positions of employment that provide the best possible engineering experience consistent with his career plans. These work periods provide the student with income that may enable him to finance the

major portion of his tuition and other expenses. Entering freshmen, as well as transfer students from community colleges whose completed work is equivalent to requirements in this program, can be admitted to the Cooperative Education Program in Engineering.

ADMISSION TO UNDERGRADUATE STUDY

The School admits those applicants who can benefit themselves and society by disciplined intellectual effort in its environment. In the selection process, there is no discrimination because of sex, race, color, religion, or national origin.

Admission is the first selective step in a long series of qualifying steps the student will take in his progress toward professional competence in engineering, and indicates the School's belief that the applicant has at least the minimum preparation and ability to complete the curriculum successfully.

The applicant must be of good character and must have an academic background appropriate for the program of studies contemplated.

APPLICATION FOR ADMISSION

An applicant for admission obtains from the Office of Admissions of the University an application blank which he must fill out completely and return with the $10* application fee.

STUDENTS FROM U. S. INSTITUTIONS

Records presented become the property of the University and *cannot* be returned.

FRESHMAN ADMISSION

Consideration for admission is based on the following:

1. An acceptable certificate of graduation from an accredited high school showing at least fifteen units†;
2. The principal's statement that the applicant is prepared to undertake college work;
3. Scores on the following College Entrance Examination Board tests: the Scholastic Aptitude Test, the English Composition Achievement Test, and a Level I (Standard) or Level II (Intensive) Mathematics Test—Level I preferred.

The qualifications of applicants who, because of unusual circumstances, do not meet the above requirements will be considered by the School, which may prescribe admission tests.

Nine and one-half of the fifteen units required for entrance must be distributed as follows: three in English, two in algebra, one in plane geometry, one-half in plane trigonometry, one in physics or chemistry, and two in one foreign

* Application fee must be by check or postal money order, payable to George Washington University. The application fee is waived for a student applying for readmission who was registered in a degree program at the time of his last registration at this University and has not since registered at another institution.

† A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods of prepared classroom work.

language or history. General science may *not* be counted in satisfaction of the science requirement but may be counted as an elective unit.

It is recommended that *both* physics and chemistry be studied in high school. A high school course in solid geometry is recommended as a firm foundation for college mathematics.

An applicant must arrange to have sent directly *from his school to the Office of Admissions* the academic record of his first seven terms in secondary school together with a personal evaluation and recommendation from his principal. This information may be supplied on a form provided by the University or on a standard form used by the secondary school provided all essential information is included.

Quantitative Deficiency.—A graduate of an approved high school who lacks not more than two units of the required subjects and who presents fifteen acceptable units may be admitted to a prescribed program which includes courses to make up his deficiencies.

Applicants who wish to begin study in the fall semester should formulate plans early in the senior high school year. Although the University prefers to have applications submitted during the fall semester of the senior high school year, applications may be submitted until March 1. Students graduating at mid-term wishing to begin study in the spring semester *should* apply no later than December 1. Applications and all required credentials of students wishing to begin study in either the first or second term of the summer session must be received prior to March 1.

Although decisions on most applications for the fall semester will require submission of seventh-term grades and senior-year test scores, an earlier decision will be given after September 1 to a student whose application becomes complete with a secondary school record through the junior year and junior-year test scores, provided these records clearly establish admissibility.

Early Admission Plan.—Unusually well-prepared students who have completed the junior year in high school may be considered for admission if they submit special credentials and have the unqualified recommendation of their principal or counselor. Inquiries should specifically mention the Early Admission Plan.

TRANSFER STUDENTS

Transfer students from other institutions (see page 20 for minimum residence requirement) should submit application and required credentials prior to August 15 for the fall semester, December 15 for the spring semester, May 1 for the summer sessions.

The transfer student must be in good standing as to scholarship and conduct. He must be eligible to return to the last previously attended institution in the semester for which he seeks admission to this University.

An applicant who has attended one or more institutions of higher learning must request *each* registrar to mail directly *to the Office of Admissions of the University* a transcript of his record, *even though credits were not earned.*

If high school units are not shown on the college transcript and if an applicant has fewer than 30 semester hours of acceptable work (*C* or better on academic work from an accredited institution), he must request that his high school record and College Examination Board Test scores be sent to the Office of

Admissions. Applicants with "marginal records" of 30 semester hours or more of work are requested to submit high school records and the College Entrance Examination Board Test scores.

STUDENTS FROM FOREIGN INSTITUTIONS

Application, required records, and scores on the *Test of English as a Foreign Language* (see below) must be received from all *foreign applicants* no later than March 1 for the fall semester and November 1 for the spring semester.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send directly to the Office of Admissions of the University official credentials listing subjects studied, grades received, examinations taken, and degrees received. Certified copies of diplomas and certificates from secondary schools and all colleges and universities attended are required. Records of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

LANGUAGE TEST

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language*. Students are responsible for making arrangements for taking the test and should address inquiries to: TOEFL, Educational Testing Service, Princeton, New Jersey 08540, U.S.A. The completed application form should be returned to the Testing Service at Princeton well in advance of the beginning of the semester for which the applicant seeks admission. The test fee, which should be remitted with the application, entitles the student to have his test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does not constitute application for admission to George Washington University

The Bulletin of Information, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and application blank. On the application for the test, the student should specify that the scores be sent to the Office of Admissions, George Washington University, Washington, D.C. 20006.

In addition to the TOEFL, an admitted student may be required to report to the Admissions Office to make arrangements for taking an English Placement Test for foreign students prior to registration. Results of this test will determine the courses the student will be permitted to register for in his program of study.

READMISSION

A student previously registered in the University who was not registered on campus during the immediately preceding semester must apply for readmission. Final dates for applying are the same as those for "Transfer Students," see pages 14–15. If the student applies for a degree program and was previously registered as a nondegree student, or if he has attended one or more higher institutions during his absence from the University, he must have complete, official transcripts sent to the Office of Admissions from each institution attended before his application will be considered. Applications for readmission are considered on the basis of regulations currently effective.

The application fee is waived for a student applying for readmission wh was registered in a degree program at the time of his last registration at thi University and who has not registered at another institution since his last regis tration at this University.

ADVANCED TUITION DEPOSIT

Upon notification of acceptance, a $100 advanced tuition deposit will be re quired of all full-time students including those readmitted. The deposit credited toward tuition and is not refundable.

ADVANCED STANDING

CREDIT FOR ADVANCED PLACEMENT EXAMINATIONS

Advanced standing may be granted for study at the collegiate level in advanced courses in an approved secondary school. if substantiated by satisfactory per formance in the appropriate Advanced Placement Examination of the College Entrance Examination Board. Advanced standing may also be granted as a result of satisfactory performance in the College-Level Examination Program (CLEP). Arrangement for the examinations is the responsibility of the appli cant and should be made with the Program Director, College Entrance Exami nation Board Advanced Placement Examinations, Box 592, Princeton, N.J. 08540, or Box 1025, Berkeley, Calif. 94701.

The applicant must request the examining service to submit the test papers and scores to the Office of Admissions. Consideration is given to both the quality of performance on the examination and the quality and content of the course of study completed by the applicant. Credit may be withheld pending satisfactory completion of higher-level courses in the same field.

Total credit that may be so granted is up to 30 semester hours, not more than 8 semester hours of which may be in any one examination area.

CREDIT FROM HIGHER INSTITUTIONS

Advanced standing (see page 20 for minimum residence requirement) may be granted for work successfully completed at an accredited institution of higher learning. Credit will be granted for transferred work only when it meets the requirements for the degree sought at this University. Only work of a grade C or higher will be considered for transfer.

CREDIT FROM TECHNICAL INSTITUTES

Advanced standing may be granted for work successfully completed at tech nical institutes. Credit will be granted for transferred work only when the ap plicant passes successfully the required validation examination. Arrangement for the examination should be made with the appropriate Department of the School. In any event, no more than 30 semester hours of credit for technical work will be granted in transfer for those who graduated from a two-year technical institute. A maximum of 60 semester hours of credit for technical work may be granted in transfer for those who graduated from a four-year technical institute.

SERVICE SCHOOL CREDIT

A limited amount of credit earned in service schools since 1941 may be considered for assignment to qualified degree candidates in the School of Engineering and Applied Science. Veterans should submit to the Office of Admissions photostatic copies of their service school records, indicating courses successfully completed with sufficient identification of the course to locate it in the *Guide to Evaluation of Educational Experience in the Armed Forces.*

CREDIT EARNED THROUGH UNITED STATES ARMED FORCES INSTITUTE (USAFI)

Credit is assigned for approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

REGULATIONS

Regulations regarding REGISTRATION, FEES AND FINANCES *are stated on pages 147–53; other University regulations, on pages 157–62.*

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered. Regular attendance is required. A student may be dropped from any course for undue absence.

A student suspended for any reason may not attend classes during the period of suspension.

The student is expected to attend every meeting of the course in which he is registered, fully prepared to carry on the work required. The student is held responsible for all work in the course, and all absences must be excused before provision will be made for him to make up the work missed. Excuses for absences from examinations which have been announced in advance can be obtained only by written application to the instructor in charge of the course.

ACADEMIC WORK LOAD

A full-time undergraduate student who is not on probation may register for no more than 20 semester hours. A student employed more than 24 hours a week who is not on probation may take no more than 10 semester hours. In exceptional cases these limits may be exceeded with the Dean's permission.

A student previously unemployed who accepts employment after registration must immediately report that fact to the Dean so that his schedule may be adjusted if necessary.

ADVISORY SYSTEM

The School of Engineering and Applied Science encourages a close faculty-student relationship. Every entering undergraduate student is assigned a permanent faculty adviser to assist him in orienting himself in the professional discipline. Faculty advisers counsel students on their programs of study, the achievement and maintenance of satisfactory scholastic performances, profes-

sional development, and extracurricular activity as part of the educational process. The adviser represents the student in all cases requiring faculty action.

Students must obtain their advisers' approval of programs of study prior to registration. Until a student has completed the work required for the degree he must consult his adviser in all academic matters. However, an adviser may not deny a student entry into any course or activity to which he is entitled under the regulations of the School.

All students are encouraged to discuss college problems with their advisers or instructors at any time; and parents or guardians are invited to consult with the Dean, Department Chairman, and advisers concerning any student problems.

Faculty advisers discharge their counseling duties in accordance with the high principles of their professional responsibility; however, the final responsibility for a student's action lies wholly with the student.

SCHOLARSHIP

For scholarship requirements for graduation, see "Graduation Requirements," page 20.

Grades.—Grades are mailed to the student through the Office of the Registrar at the close of each semester.

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Passing; *F*, Failing. Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) is recorded.

At the option of the instructor, the grade of *I* (Incomplete) may be recorded if a student, for reasons beyond his control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons. The reasons must be presented to the instructor before the last day of classes for the semester in which the course is given. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, he may initiate an appropriate grade change. Although the grade of *I* may remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or required paper) must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An *I* cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council.

Quality-point Index.—Scholastic standing is computed in terms of the quality-point index obtained by dividing the number of quality points by the number of semester hours for which the student registered.

Quality points are computed from grades as follows: *A*, four points; *B*, three points; *C*, two points; *D*, one point; *F*, no points, for each semester hour for which the student registered. Courses marked *W* or *I* are not considered in determining the index, except that courses marked *I* will be considered when a formal grade is recorded. Grades in courses at another institution are not considered in computing the quality-point index.

Mid-semester Warning.—At the end of the seventh week of each semester, instructors report to the Dean the names of students whose scholarship is un-

satisfactory. On receipt of a warning notice the student must consult his instructor and his adviser immediately.

The adviser may prescribe diagnostic tests and/or remedial study to be completed before the end of the current semester.

Probation.—A full-time student (one taking 12 semester hours or more) whose quality-point index based on all courses attempted in his most recent semester falls below 2.00 for that semester, or who receives two grades or more of *F* in one semester, will be placed on probation. A student enrolled for less than 12 semester hours during the fall or spring semester and a student enrolled during the summer sessions is subject to probation or suspension on the basis of his record for 12 semester hours, rather than on his record in any one semester. The probation period is for one semester for full-time students, or the next 12 semester hours of study for part-time students.

If a student earns a quality-point index of at least 2.00 in all courses taken during the period of probation and receives no grade of *F* during this period, he is removed from probational status.

If a student fails to achieve a quality-point index of 2.00 for all courses completed during the probation period, he is continued on probation for an additional period of one semester or 12 semester hours of study.

Upon being placed on probation, a student must undertake the Engineering Student Probation Program of testing, counseling, and remedial work available at the Counseling Center. A student on probation is required to follow a program of study prescribed by his adviser and Department Chairman, and is not eligible to participate in student activities.

Suspension.—If a student receives two or more grades of *F* during a probation period he will be suspended. If a student fails to achieve a quality-point index of 2.00 in a second consecutive period of probation, he will be suspended. A student who has been on probation for three periods and who fails to achieve a quality-point index of 2.00 in the third period or any subsequent semester will be suspended.

DEAN'S HONORS LIST

The Faculty of the School recognizes meritorious scholastic achievement by a Dean's Honors List, containing the names of candidates for undergraduate degrees whose scholastic achievement satisfies all of the following requirements:

1. The student must have completed a minimum of 13 semester hours in one semester with a quality-point index of 3.00 or higher and with no more than one grade of *C*.
2. No grade below *C* may have been received during the qualifying period.
3. No disciplinary action may have been taken with respect to the student.

The Dean's Honors List is prepared at the end of the fall and spring semesters and displayed in an appropriate public place in the School. A notation is made on the student's record each time his name is included in the List.

USE OF CORRECT ENGLISH

Any student whose written or spoken English in any course is unsatisfactory may be reported by the instructor to the Dean. The Dean may assign supplementary work, without academic credit, varying in amount with the needs of the student. If the work prescribed is equivalent to a course, the regular tui-

tion fee is charged. The granting of a degree may be delayed for failure to make up any such deficiency in English to the satisfaction of the Dean.

GRADUATION REQUIREMENTS

See page 160 for general requirements for graduation.

RESIDENCE

A minimum of 30 semester hours must be completed in residence. Summer work may be counted. Unless special permission is granted by the Dean to study elsewhere, the work of the final year must be completed in residence.

SCHOLARSHIP

To be eligible for graduation a student must have a quality-point index of at least 2.20 in those technical courses specified in the fifth through the eighth semester of his curriculum.

HONORS

With Distinction.—A Bachelor's degree may be conferred "With Distinction," at the discretion of the Faculty, if a student attains a quality-point index of 3.50 or higher on all work taken at this institution. To be eligible for this honor a student must have completed at this institution at least one-half of the work required for the degree.

Special Honors.—A Bachelor's degree may be conferred with "Special Honors," at the discretion of the Faculty, for outstanding achievement in the student's senior year work on recommendation of the Faculty, under the following regulations:

1. The student must have his candidacy for Special Honors approved by the department chairman representing his major field not later than the beginning of his senior year.
2. The student must meet such other conditions as may be set at the time his candidacy is approved.
3. No student will be awarded Special Honors unless he has a quality-point index of at least 3.00 on all work taken at this institution.
4. To be eligible for Special Honors a student must have completed at this institution at least one-half of the work required for the degree.

UNDERGRADUATE CURRICULA

The four-year undergraduate curricula lead to the degree of Bachelor of Science with parenthetic designation of the major; for example, Bachelor of Science (Electrical Engineering). Students who are deficient in preparation require a longer period; those who are admitted with advanced standing or who attend summer sessions can complete the requirements in less time.

The program of the first four semesters (2 years) is common to all curricula and provides the essential broad base of scientific principles and mathematical techniques necessary for the professional courses of the last four semes

ters, together with an appropriate background in the humanities and social sciences (see below).

A minimum total of 130 semester hours is required to qualify for the degree. However, students are encouraged to elect additional course work above the required minimum to the extent that their interests and the School's offerings permit.

Degrees are offered in Civil Engineering, Electrical Engineering, and Mechanical Engineering, and each field provides an area of concentration in Computer Science. Students in Civil Engineering may also select an area of concentration in Environmental Civil Engineering; students in Mechanical Engineering may also select an area of concentration in Energy Resources and Power.

The student is assisted by his faculty adviser, who approves his program each semester prior to registration. For the guidance of the student and his adviser, every beginning student takes the School's placement examinations in English, reading, algebra, and trigonometry and, if deficient in any of these areas, must take remedial work in the area of deficiency.

COURSES IN THE HUMANITIES AND SOCIAL SCIENCES

The basic purpose of a program in the humanities and social sciences for engineering students is to assist the student in acquiring knowledge which will permit him to understand the social and humanistic elements of the past and present and to analyze the problems facing his society today. The ultimate goal is to help the engineer have a better understanding of his society and an appreciation of his role and responsibilities within it.

Since the education of an engineering student is, by necessity, oriented toward technical subjects, his program in the humanities and social sciences should not emphasize technical aspects and skills, but should rather consist of courses which can broaden his outlook. As a consequence, courses in subjects such as accounting, finance, industrial management, introductory languages, and personnel administration should not be included in the humanities and social sciences program. On the other hand, courses in areas such as anthropology, economics, fine arts, geography, history, literature, philosophy, political science, psychology, and sociology are considered appropriate.

Each engineering student is required to prepare, with the assistance of his faculty adviser, a program of courses in the humanities and social sciences, explaining how his program meets the purpose stated above. The student's program must include a minimum of 18 semester hours and must be approved by both his adviser and department chairman.

Graduate Study

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE offers graduate study leading to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science.

In its graduate programs, the School, as it does in undergraduate study, adheres to the educational philosophy of increasing the knowledge and understanding of the individual student by concentration on principles and their application rather than by encyclopedic coverage of techniques and specialized

detail. Each program is individually planned according to the student's prep ration and needs.

Graduate study may be undertaken in any field of engineering or appli science in which the School has adequate facilities and resources. Upon a proval, the student may select courses in other departments of instruction the University in order to serve specific needs or objectives. A complete list available fields and areas of concentration is included under each departmen listing in the "Programs of Study and Courses of Instruction" section of th catalogue (pages 41–146).

THE MASTER'S PROGRAMS

The student's program may provide for broad coverage in a variety of fiel or may be designed to provide a concentration in particular areas. The min mum program consists of 24 semester hours of approved graduate courses an a Master's thesis (equivalent to 6 semester hours). With the approval of th department the student may elect an optional program without a thesis whic consists of a minimum of 33 semester hours of approved graduate courses. A Master's candidates are required to pass a Master's Comprehensive Examina tion. Students whose undergraduate study does not include necessary prerequi sites may be required to take more than the minimum semester hours required

Upon admission the student is assigned an adviser. Programs of study are determined by any prerequisites established and the requirements of the depart ment in which the student wishes to study. The program of studies in prepara tion for the Master's Comprehensive Examination must be approved by the student's adviser and the appropriate department chairman.

ADMISSION

Admission to graduate study toward a Master's degree requires an appropriate Bachelor's degree from a recognized institution and evidence of capacity for productive work in the field selected, as indicated by undergraduate grades Graduate Record Examination scores, and similar data.

An applicant who has significant deficiencies in preparation may be required to take prescribed undergraduate courses as an unclassified student before being admitted to graduate student status. In some cases, if such deficiencies are minimal, he may be admitted to graduate student status and allowed to take a limited number of graduate courses while completing the undergraduate courses in which he is deficient. In no case may the undergraduate courses thus taken fulfill any part of the requirements for the Master's degree.

For additional admissions requirements for the degrees of Master of Engineering Administration and Master of Science in the Department of Engineering Administration, see pages 125, 128; for the degree of Master of Science in the Department of Operations Research, see page 138. Candidates for the degree of Master of Science in the Department of Electrical Engineering and Computer Science must have satisfied specific undergraduate requirements depending upon the area of concentration. Students should consult the special brochure *The Graduate Programs of the Department of Electrical Engineering and Computer Science.*

ADMISSION PROCEDURE

Forms for application for admission are available at the School of Engineering and Applied Science. They must be submitted, together with the nonrefundable application fee of $25, to the Manager of Engineering Admissions, Room 100, Tompkins Hall of Engineering, George Washington University, Washington, D.C. 20006, no later than September 1 for the fall semester, December 15 for the spring semester, May 1 for the first summer session, and June 1 for the second summer session. The applicant must request each educational institution attended since high school graduation to send an official transcript of his record directly to the Manager of Engineering Admissions. If the applicant has completed the Graduate Record Examination, he should request that his scores be sent to the School. The applicant will be notified by mail when a decision on his admission has been made. Foreign students are required to take the *Test of English as a Foreign Language* (see page 15).

All inquiries and correspondence relative to graduate admission should be directed to the Manager of Engineering Admissions.

TRANSFER CREDIT

Up to 6 semester hours of satisfactory credit (with grades of *A* or *B*), which normally must have been earned in a graduate program at another recognized institution, *may* be accepted in transfer, when applicable, to satisfy Master's degree requirements in this School. However, the student must, with the approval of his adviser, petition to the appropriate department chairman for such a transfer.

REGISTRATION

A graduate student may register for classes when he presents an official letter of admission or his Registration Card from the previous semester. No registration is accepted for less than a semester or one summer session.

Concurrent registration in this School and in another institution not a member of the Consortium of Universities of the Washington Metropolitan Area, Inc., or another division of this University requires the written permission of the Deans concerned, *prior to registration*. Allowance of credit for work done concurrently at another institution is at the discretion of the Dean.

Dates and hours of registration are stated in the Calendar, page 4, and in the *Schedule of Classes* published in advance of each semester.

MASTER'S THESIS

In those programs requiring a thesis, the degree candidate must submit an acceptable thesis to demonstrate his ability to make independent use of the knowledge and discipline of thought acquired and developed by graduate study, to furnish objective evidence of constructive power in a given field, and to demonstrate that he can communicate the results of his work in writing. Work of a suitable character for which the student has professional responsibility may be considered, whether done on or off campus, provided no significant amount of work is completed without faculty supervision.

As a part of registration for the thesis course 299, the candidate must submit to the appropriate department chairman (on the form obtainable at the School office) his thesis area, approved by his faculty adviser. He must submit his

thesis title to the Dean, on the form available in the School office, at the beginning of the semester in which he expects to graduate. Registration in thesis 299–300 entitles the student, during such registration, to the advice of the member of the faculty under whom the thesis is to be written. He may consult his adviser, but the thesis is the exclusive responsibility of the student.

The thesis in final form must be submitted to the appropriate department chairman by the date stated in the calendar for the semester in which the candidate enrolls in thesis 300. In case a thesis is unfinished on the date specified, the student will be granted an additional semester and must pay the "Continuous Registration" fee (see page 150) unless he is registered for course work. If the preparation of the thesis extends beyond the three semesters, approval for an extension of time will be required and the student must reregister for thesis 300 and pay tuition as for a repeated course. The over-all time limit for earning the degree (see pages 25–26) may not be exceeded.

A thesis may be submitted in final form one time. The acceptability of the thesis is determined exclusively by the Master's Comprehensive Examination committee. If the thesis is unacceptable, the student's graduate status is terminated.

Printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the School. Accepted theses, with accompanying drawings, become the property of the University and are deposited in the University Library, where the duplicate copies are bound and made available for circulation.

OPTIONAL MASTER'S PROGRAM WITHOUT A THESIS

With the approval of the department, a student may elect an optional program without a thesis which consists of a minimum of 33 semester hours of approved graduate courses.

MASTER'S COMPREHENSIVE EXAMINATION

The student must pass a Master's Comprehensive Examination, to demonstrate substantial understanding of principles and method and their use in the area of his interest. This Examination may be written, oral, or both. A graduate student who fails any portion of the Master's Comprehensive Examination on his first attempt may be examined one more time if approval is given by the appropriate Examining Committee. In the event of failure to complete the Examination satisfactorily, the student's graduate status terminates.

REGULATIONS

Regulations regarding REGISTRATION, FEES AND FINANCES *are stated on pages 147–53; other University regulations, on pages 157–62.*

ATTENDANCE

A student may not attend classes until registration is completed and fees are paid. He may attend only those classes for which he is registered. A student is expected to attend every meeting of the course in which he is registered, fully prepared to carry on the work required. A student may be dropped

from any course for undue absence. Excused absences must be arranged with the instructor.

SCHOLARSHIP

Grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; and *CR*, Credit for satisfactory thesis completion. Whenever a grade is not assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) is recorded.

At the option of the instructor, the grade of *I* may be recorded if a student, for reasons beyond his control, is unable to complete the work of the course, and if the instructor is informed of, and approves, such reasons before the date when grades must be reported. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, he may initiate an appropriate grade change. Although the grade of *I* may remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An incomplete which is not removed within one calendar year is automatically changed to an *F*.

A student may not repeat for credit a course in which he has received a grade of *C* or above, unless required to do so by the department concerned. A written statement requiring the student to repeat such a course for credit must be submitted to the Registrar by the appropriate department chairman. For Master's work, a minimum of 24 semester hours (for those who receive credit for a thesis) or 33 semester hours (for those who follow the program without a thesis) of graduate course work with the grade of *B* or higher required for graduation. Students who receive two grades of *F*, or (except those registered prior to and in continuous residence since the 1967 fall semester) three grades below *B*, are barred from further enrollment in graduate courses and, ordinarily, will not be readmitted to gradute study. Students who receive the grade of *C* in one or two courses are required to take additional course work to make up the minimum semester hours of work with grades of *B* (except those registered prior to and in continuous residence since the 1967 fall semester).

RESIDENCE

In general, a minimum of one year of full-time study, or the equivalent in part-time study, must be completed in the School.

TIME TO COMPLETE MASTER'S DEGREE REQUIREMENTS

A full-time student in the Master's program is allowed a maximum of three calendar years to complete all degree requirements, from the date of his first graduate-student status registration in prerequisite or graduate courses. A part-time student in the Master's program is allowed a maximum of five calendar years. The time limit does not include any period of registration as an unclassified student before admission to graduate student status, nor does it

encompass any specified period spent on approved leave of absence. Readmission is required upon expiration of leave of absence under the conditions and requirements then prevailing.

Students who do not complete degree requirements within the allowed time have their graduate status terminated. They may be readmitted to graduate status under conditions specified by the department chairman and approved by the Dean.

THE DOCTORAL PROGRAM

The School of Engineering and Applied Science offers a program of advanced study and research leading to the degree of Doctor of Science. This program is limited to those fields in engineering or applied science in which a discipline has been established and for which the University has or can arrange adequate resources.

The doctoral program is designed to prepare the student for a career of creative scholarship by providing a broad but balanced background of knowledge and guidance in the performance of research. It requires study of interrelated fields of learning as well as original research in the field of central interest.

The program for the degree is divided into two stages. The first—made up of a study of interrelated fields of learning which supports the general area of research concentration—culminates in the qualifying examination. The second—composed of research investigation of a particular subject in a special field and the presentation of such research findings in a written dissertation—culminates in the final examination.

ADMISSION TO DOCTORAL STUDY

A satisfactory Master's degree from an accredited institution is required, together with acceptable personal qualities and a capacity for creative scholarship. Normally, a *B* average in graduate work is required. However, the minimum does not assure automatic acceptance; the departments may, and often do, set higher admission standards.

APPLICATION FOR ADMISSION

Forms for application for admission are available at the School of Engineering and Applied Science. They must be submitted, together with a nonrefundable application fee of $25, to the Manager of Engineering Admissions, Room 100, Tompkins Hall of Engineering, George Washington University, Washington, D.C. 20006. The prospective doctoral student seeking admission should apply before June 1 for the fall semester and before December 1 for the spring semester. Personal interviews may then be arranged to discuss the applicant's qualifications and the possibilities for an effective doctoral program. The applicant must arrange for complete documentary records (transcripts) to be forwarded to the Manager of Engineering Admissions in sufficient time to permit assembly of complete records for evaluation as soon after the above application deadlines as possible.

The applicant must arrange for letters of recommendation to be submitted from two faculty members of the institution from which he received his Ma-

ter's degree; one of these, if possible, should be from his Master's adviser. The letters should be addressed to the appropriate department chairman.

LANGUAGE REQUIREMENT

A doctoral student should maintain a broad outlook as he pursues his study, and therefore must have the capability of reading appropriate literature published in a foreign language. Accordingly, a reading knowledge of one foreign language, preferably Russian, must be demonstrated before admission to the qualifying examination. If the student wishes to satisfy this requirement with a language other than Russian, he must obtain the approval first of his doctoral adviser, then of his department chairman; permission to use a language other than Russian will be granted on the basis of its importance to the student's field of interest.

TOOL REQUIREMENT

In addition to the language requirement, an examination in a tool requirement (e.g., computer programming) may be established by the various departments.

STUDY FOR THE QUALIFYING EXAMINATION

Upon admission to the first stage of the program, i.e., study of interrelated fields culminating in the qualifying examination, the student is assigned a faculty adviser who directs his studies.* The adviser approves appropriate fields of study to insure the student's breadth of knowledge and to support research in his central field of interest, advises him concerning the scope and content of his fields of study, and guides him in preparing for the qualifying examination. Programs of study are normally structured to include a major field of study and two minor or supporting fields.

A minimum of 30 semester hours of credit in a formal program at the graduate level beyond Master's study is required. In many cases, particularly in those in which the student undertakes a doctoral program in a field other than that in which he obtained his Master's Degree, the program of studies exceeds 30 semester hours.

Students admitted to doctoral study are encouraged to undertake one year of full-time study on campus. In general, the adviser will require the student to register for a minimum of 6 semester hours of course work in every semester except the summer sessions.

TRANSFER OF CREDIT

Up to 6 semester hours of credit earned in courses completed with the grade of *A* or *B* while enrolled in a doctoral program at another accredited institution may be accepted in transfer to satisfy doctoral requirements of this School, subject to the approval of the student's adviser and his department chairman. Credit earned in courses completed more than five years prior to admission to the doctoral program will not be accepted in transfer, and some departments may require that transfer credit must have been earned within a shorter period of time before admission.

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*In some departments, instead of a faculty adviser, a faculty committee may be appointed to approve programs, direct study, and carry out all other responsibilities of the faculty adviser.

THE QUALIFYING EXAMINATION*

The purpose of the qualifying examination is to ascertain that the student's background and intellectual development are adequate to support doctoral research in his central field. Qualifying examinations may be written or oral, or both, and are scheduled over a period of several days. They are conducted only during the fall and spring semesters on dates established by the departments and are administered by a faculty committee. Upon favorable report of the examiners to the Dean through the appropriate department chairman, the student is admitted to candidacy for the degree; he then begins his specialized study and research under the supervision of a designated member of the faculty or, in special instances, an outstanding engineer/scientist who is not a member of the faculty.

The qualifying examination is the principal means used to determine the student's ability to qualify as a candidate for the doctoral degree and to enter the second stage of his program.

At the discretion of the committee which prepared the examination, the doctoral student may be given a second opportunity to qualify for candidacy in the event of failure in any part of the qualifying examination. In general, the entire qualifying examination must be retaken by the student in order to qualify for candidacy.

SCHOLARSHIP

To be admitted to the qualifying examination, the doctoral student must achieve an over-all academic average of 3.20 on a scale of 4 (a grade of *A* equals 4 points; *B*, 3 points; *C*, 2 points; and *F*, 0 points). No doctoral student may receive more than two course grades below *B*. If he does receive more than two course grades below *B*, his graduate study is terminated and his further enrollment prohibited. Courses in which the student earns grades below *B* are not included in his total semester-hour requirement for the degree. In the event a student receives any grade below *B*, he is required to consult with his adviser for a review of his program of study and discussion of possible changes therein.

RESEARCH, DISSERTATION, FINAL EXAMINATION

The student admitted to candidacy for the degree of Doctor of Science requests as Director of Research the member of the faculty under whom he wishes to conduct his research. The faculty member may accept or reject such request. The research area is approved by the Director and the appropriate department chairman. Throughout the remainder of the doctoral program the candidate works directly under his Director in his dissertation research. However, the student is not precluded from consulting with other members of the faculty, as may be required, on an informal basis, and may be encouraged to do so by his Director of Research. A committee of the faculty consisting of three members including the Director as chairman will advise in the final preparation of the dissertation. The department chairman appoints such a committee on the recommendation of the Director of Research. Work on the dissertation is equivalent to a minimum of 24 semester hours.

* Some departments may administer a pre-qualifying examination prior to completion of the student's program.

THE DISSERTATION

A dissertation is required as evidence of ability to perform original scholarly research and to present and interpret the results. The student is solely responsible for the content of his dissertation.

The aim of the student in this stage of his candidacy is the production of a dissertation which embodies the results of an extended study original in nature and which includes material deemed worthy of publication in recognized scientific and engineering journals. The student is expected to attempt to publish the results of his research as soon as possible after he receives his degree and to submit copies of the published material to the Dean. Credit must be given in the publication to the fact that the material is abstracted, summarized, developed, etc., from a dissertation submitted to George Washington University in partial fulfillment of the requirements for the Doctor of Science degree.

The candidate must submit to the appropriate department five complete copies of the dissertation and two original copies of an abstract (not to exceed 600 words) of his dissertation no later than the date specified in the calendar. One copy of the abstract is for inclusion in the announcement of the examination and one for reproduction by University Microfilms, Inc. One copy of the dissertation is also sent to University Microfilms, Inc.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation, preparation of the abstract, and services offered by University Microfilms, Inc., are available at the School Office. The successful candidate for the doctorate is required, before receiving his degree, to pay a fee to cover a part of the expense of printing the abstract of his dissertation, and for the basic service rendered by University Microfilms, Inc. Accepted dissertations, with accompanying drawings, become the property of the University and are deposited in the University Library where bound copies are available for circulation.

THE FINAL EXAMINATION

Upon acceptance of the dissertation by the committee, consisting of the Director and two other faculty members of this School, which has assisted in supervising its final preparation, the candidate is presented for his final examination. The final examination is oral and is open to the public. The candidate must demonstrate a mastery of his special fields of study and of the materials and techniques used in the research. The committee of examiners will consist of not less than five members, three of whom must be members of the faculty on full-time service. The committee may include qualified experts brought to the University especially to participate in the examination. The Director of Research serves as Advocate for the candidate. When the candidate satisfies the examining committee of the high quality and originality of his contribution to knowledge as well as his mastery of the scholarship and research techniques of his field, the committee of examiners recommends him for the degree of Doctor of Science. The final examination is conducted only during the fall and spring semesters. The candidate should consult with the appropriate department chairman as to possible dates for the examination.

RESIDENCE AND CONTINUOUS STUDY

The work for the degree must be done in residence (on the campus), ex-

cept when special permission is granted by the chairman of the department. The student must maintain continuous registration in the School. Failure to do so breaks the student's registration, and he must apply for readmission to doctoral study under whatever conditions and regulations are in effect at that time. In case of incapacity or other legitimate reasons, the student may be granted a leave of absence of up to one year. Extension of such leave will require special request to and approval of the appropriate department chairman. During approved leave of absence, the student must maintain continuous registration. The time period for completion of all requirements for the degree will be adjusted on the basis of the approved leave of absence.

In general, one year of study is the minimum amount of time to be spent in preparation for the qualifying examination. The qualifying examination must be completed within five years of the date of admission, and the entire degree program must be completed within seven years. After admission the student may apply for his qualifying examination whenever he believes that he is properly prepared. A minimum of two years of full-time study and research should be expected in meeting the requirements for the degree.

Special Programs

INSTITUTE FOR THE STUDY OF FATIGUE, FRACTURE, AND STRUCTURAL RELIABILITY

THE INSTITUTE for the Study of Fatigue, Fracture, and Structural Reliability of the School of Engineering and Applied Science is under the technical direction of Dr. A.M. Freudenthal, an internationally recognized authority. The basic objective of the Institute is to develop an interdisciplinary approach to fatigue research through close cooperation of research workers from different fields. The Institute deals principally with the study of the physical mechanism of damage initiation, in order to establish principles for the rational design of metal alloys of superior fatigue performance on the one hand, and to develop advanced methods of fatigue design and reliability on the other. Because of the large volume, past and current, of straight fatigue testing of standard test specimens in industrial, government, and university laboratories, no testing of this type is generally conducted by the Institute. However, results of such tests appearing in publications and reports are carefully scrutinized for their significance in terms of the purposes of the Institute. In addition to advancing interdisciplinary research, the Institute provides specialized training for graduate students.

The Institute conducts seminars, issues technical reports, and supplies information, lectures, and consultations to many government and industrial research and development laboratories.

INSTITUTE FOR MANAGEMENT SCIENCE AND ENGINEERING

The Institute for Management Science and Engineering defines and develops new management techniques required to keep pace with our ever-expanding technology. It provides a multidisciplinary environment for innovative graduate teaching and substantial opportunities for research activities and public service under diversified sources of external support. The principal academic

fields directly involved are operations research, management science, and the computer sciences.

The programs of the Institute are concerned with important educational and public-service needs for conservation of national resources. Such programs require full-time interaction among students, faculty, and staff in ways possible only at universities. Through its Program in Logistics, the Institute performs research leading to the development of a science of logistics featuring principles and methodology for resource allocation problems in civil affairs and national defense efforts.

Participation by faculty members and graduate students from all schools in the University is encouraged as consistent with the multidisciplinary objectives of the Institute. Graduate students are supported through research assistantships with thesis and dissertation efforts ordinarily being the major work responsibilities. Reliance is also placed on staff research specialists, and there are special provisions for substantial contributions from "distinguished visitors" from government, private industry, and other universities.

The Institute disseminates its results through seminars, colloquia, conferences, and a special series of monographs. All of the research is unclassified.



RE GWU—NASA-LANGLEY GRADUATE PROGRAM

eorge Washington University, in cooperation with the National Aeronautics d Space Administration's Langley Research Center, has a full-resident grad- te engineering program at NASA-Langley, in Hampton, Va., approximately 0 miles south of Washington, D.C.

The program is open to qualified NASA employees and area residents. urses may also be taken by nondegree students, with the approval of the tructor. Students may be permitted to transfer a maximum of 6 semester rs of approved graduate course credit from other accredited institutions. Courses in the program are taught by NASA scientists and engineers and faculty of the School of Engineering and Applied Science. NASA-Lang-

ley's extensive scientific and engineering facilities and equipment are utiliz whenever feasible.

The program at NASA-Langley leads to the degrees of Master of Scienc and (by special permission of the appropriate department chairman) Doctor o Science in the fields of acoustics, aerospace engineering (including options i aeronautics and astronautics), applied mechanics, computer-aided structur design, computer science, electrical engineering, flight sciences, materials en gineering, and mechanical engineering.

Information regarding this program may be obtained from John L. White sides, Jr., Coordinator, GWU-NASA Program, Mail Stop 69, NASA-Langle Research Center, Hampton, Va. 23365.



THE GWU—NASA-LANGLEY JOINT INSTITUTE FOR ACOUSTICS AND FLIGHT SCIENCES (JIAFS)

The National Aeronautics and Space Administration's Langley Research Center joined with George Washington University's School of Engineering and Applied Science in 1971 to create the Joint Institute for Acoustics and Flight Sciences. This jointly operated Institute is dedicated to increasing the nation's research and engineering capabilities in relevant technical fields such as acoustics, flight sciences, and computer-aided structural design. The Institute, which is lo cated at the Langley Research Center, is dedicated to the advanced training of students and professional engineers in the fields of acoustics, flight sciences, and computer-aided structural design, and other relevant areas, and serves to provide a center for advanced research by bringing together researchers and

scholars from these fields for the exchange of ideas and findings. It is also the purpose of the Institute to provide the necessary facilities for qualified researchers and scholars who want to engage in research work in these areas.

The organization of the Institute consists of a director, John E. Duberg, Associate Director of the NASA-Langley Research Center, and a co-director, Harold Liebowitz, Dean of the George Washington University's School of Engineering and Applied Science.

JIAFS currently offers academic and research programs in the areas of Acoustics, Flight Sciences, Computer-aided Structural Design, and Environmental Modeling. The objective of the program is to prepare qualified graduate students for careers in research, development, design, and teaching to meet the challenges of ever-increasing technical problems and the nation's needs in these fields. The education and research opportunities offered in the program combine the academic resources of George Washington University and the professional research resources and facilities of NASA-Langley Research Center. These opportunities also enable students to involve themselves in research projects that excite their interest and permit them to associate with prominent visiting members who are working on related problems. Most of the faculty and NASA scientists conduct research, and students are closely knit into the intimate association of research and instruction from the day of their arrival. It is believed that the experience of the students during their stay at the NASA-Langley Research Center will be highly rewarding and will benefit them throughout their future careers.

The current education and research programs are the following:

Acoustics Program.—The Acoustics program is concerned with the problems of alleviating noise and with providing a technical base for design of acceptable aircraft and space vehicles, noise-resistant structures, and ground transportation systems. Areas of current research interest include boundary-layer noise, duct acoustics, jet noise, nonlinear problems in acoustics, rotor noise, structural response to noise, mechanical and acoustical coupling problems, and subjective response to noise and vibration.

Flight Sciences Program.—The Flight Sciences program deals with advanced flight concepts of both CTOL and V/STOL aircraft, including areas of flight dynamics, instrumentation, guidance and control, aeroelasticity, and systems analysis. Specific research areas that are currently being investigated include aerodynamic analysis of jet-augmented wings, stability and control of V/STOL aircraft, analysis and flow visualization of wing-tip vortices, wind-tunnel and flight testing of V/STOL aircraft, stall-spin characteristics of aircraft, experimental evaluation of aircraft handling characteristics, and ride-quality control of STOL aircraft.

The Computer-aided Structural Design Program.—The Computer-aided Structural Design program is designed to provide a basis and working knowledge of advanced computer applications in interdisciplinary and optimum design of aircraft, areospace, and other structures. Current research topics in this program include improved methods of automated design; efficient and accurate numerical methods for analysis of complex aircraft, aerospace, and other structures; multidisciplinary and integrated design procedures; new algorithms for optimization methods; and interactive graphics.

The Environmental Modeling Program.—The Environmental Modeling Program is aimed at developing mathematical models which characterize the atmosphere for use in predicting pollutant distributions and transport, and for

use in interpretation of satellite remote measurements of atmospheric consti
ents. Areas of research include direct and inverse techniques for the radia
transfer problem; effects of particulates on atmospheric chemistry and ener
balance; role of chemistry, mass transport, and radiative transport in mod
of the stratosphere and troposphere.

Participating in these programs are Graduate Student Research Scholar Assis
ants, faculty from George Washington University and the Institute of Soun
and Vibration Research of the University of Southampton, England, scientis
and engineers from NASA-Langley, and visiting scientists and engineers.

A number of Research Scholar Assistantships are available to qualifie
students seeking an outstanding opportunity for graduate study and research
leading to the degrees of Master of Science and Doctor of Science in the
fields of Acoustics, Flight Sciences, and Computer-aided Structural Design. Ap
plicants who are awarded Research Scholar Assistantships will receive stipends
of up to $6,500 a year for a Master of Science degree and $7,500 a year for
the Doctor of Science degree. Applications, a JIAFS brochure, and additional
information may be obtained from Professor S.W. Yuan, JIAFS, School of En
gineering and Applied Science, George Washington University, Washington
D.C. 20006.

THE GWU—NSRDC GRADUATE PROGRAMS

Off-campus graduate programs are offered in cooperation with the Naval Ship
Research and Development Centers, Annapolis and Carderock, Md. Programs
of study lead to a Master's degree in the fields of engineering administration,
ocean and marine engineering, materials science, or systems science. The pro
grams are open to all qualified applicants in the Annapolis and Carderock areas.
Students not seeking a degree may register for courses offered in these programs
providing they have the approval of the faculty adviser at the time of registra
tion. For additional information, write to the Manager of Engineering Admis
sions, School of Engineering and Applied Science, George Washington Univer
sity, Washington, D.C. 20006.

COOPERATIVE EDUCATION PROGRAM IN ENGINEERING

Cooperative education is a process of education which formally integrates the
student's academic study with work experience in cooperating employer organi
zations. The usual plan is for the student to alternate periods of college study
with periods of experience in appropriate fields of industry and government.
The experience periods are considered an integral part of the student's educa
tion. Through the interaction of the study and work experiences, the student
enhances his academic knowledge, his personal development, and his profes
sional preparation. The teaching faculty, the coordinators, and the employing
supervisors share in the educational process of the cooperative student.

The following factors are adhered to as closely as possible for the student's
working experience:

1. The student's employment is related as closely as possible to his field of
study and individual interest within his field.
2. The employment is considered to be a regular, continuing, and essential
element in the educational process.
3. The working experience will ideally increase in difficulty and responsi-

bility as the student progresses through the academic curriculum. Normally the salary of the student will increase accordingly.

The student's working experience in industry or government gives him the opportunity to meet and work with men and women under varied conditions, to get along with them, learn from them, respect them, and earn their respect. Indeed, these advantages alone could be just as important in shaping a young person's life as the opportunity to obtain experience in a chosen field.

ADVANTAGES OF COOPERATIVE EDUCATION

Combines Theory and Practice.—By coordinating the work experience in industrial and governmental organizations with the campus education program, theory and practice are closely integrated, and students find greater relevance in their studies. As a result of this alternation between academic and industrial environments, the student tends to understand the role and meaning of each environment, with a deeper appreciation for each.

Helps Finance Educational and Living Expenses.—The student's earnings will contribute substantially to financing his own education and living expenses, leading to independence and contributing significantly to his self-esteem and confidence. As stated earlier, it is expected that as the working experience increases in difficulty and responsibility as the student progresses through the academic curriculum, the salary of the student will increase accordingly.

Serves as a Bridge to the Future.—Cooperative education helps markedly to orient students to the world of work. Most students are genuinely concerned about their future life work. They want to know more about the range of occupations open to them and the potentials and limitations of these fields. They want to know about the qualifications demanded and their own fitness. Through cooperative education programs, students have opportunities for exploring their own abilities in connection with real jobs, and they find a direct means of gaining information and guidance not only in the occupations in which they are employed but in a number of related fields as well. They have a chance to test their own aptitudes more fully than is normally possible on campus.

Increases Motivation to Achieve.—This coordination of work and study increases student motivation. As students see connections between jobs they hold and the things they are learning in school, greater interest in academic work develops. During the work periods there is a tendency for the student to develop good work habits because his efforts as a productive and salaried employee are rated by the employer.

Enhances Human Relationships.—Because the work experiences involve the students in relations with co-workers who come from a variety of backgrounds, and because success in these jobs requires constructive relationships with colleagues, most students in cooperative education develop deeper understanding of other people and greater skills in human relations.

Augments Development of Maturity.—For many students the work experience contributes to an increased sense of responsibility for their own efforts, more dependence on their own judgments, and a corresponding development of maturity. In addition, the student's role as a team member in a real and productive working environment inculcates a seriousness of life and purpose which is often delayed for the traditional college graduate.

RESPONSIBILITIES OF THE COOPERATIVE STUDENT

As a cooperative student working in association with the professionals in his

field, the student must adopt professional standards of conduct. He is also a representative of the George Washington University School of Engineering and Applied Science. After each work period the student prepares a report describing his duties and responsibilities at work, and his supervisor sends an appraisal of his work performance to the Cooperative Program Coordinator. These reports are reviewed with the student and become part of his University record.

The cooperative program is a three-way partnership among the student, his employer, and George Washington University. The student's responsibilities extend equally to each of the other two members of the partnership, and this partnership cannot be altered during the program without the knowledge and consent of all.

WHY EMPLOYERS PARTICIPATE IN COOPERATIVE EDUCATION PROGRAMS

Industry and government agencies have found that cooperative students are valuable employees. Generally speaking, they are alert and energetic young people who, stimulated by a definite goal, return more than a day's work for a day's pay. Graduates of the cooperative program represent a good source of well-trained manpower. The training period provides an opportunity for the employer to evaluate the student as a prospective permanent employee. Employers feel that this program is an important part of their effort to attract well-qualified employees. At the same time, the student is able to evaluate the employer in terms of his future plans and interests. About half of the cooperative graduates establish such mutually beneficial relationships with their employers that they remain in permanent employment after graduation, with a substantial head start in their careers.

It is emphasized, however, that neither the student nor the employer is obligated for permanent employment after graduation. Industry and government agencies consider participation in cooperative education as a long-range investment rather than a current expense. As a partner with the University, the employer is engaged in a joint effort to develop young talent more fully, thus assuring better education for the student, improved utilization of the graduate and greater cooperation with the University.

SCHOLARSHIP REQUIREMENTS

Students entering the program must be in good academic standing and must have completed at least two semesters of academic study prior to their first work assignment. To remain in the program, the student must maintain a passing average and perform satisfactorily for his employer.

LIVING ACCOMMODATIONS

Arrangements will be made for students in the cooperative program to retain their dormitory and dining privileges at the University, if they so desire, during the work periods. During this time, they will also retain full student privileges and have access to all University facilities. Faculty will be available for consultation by appointment.

WORK-STUDY SCHEDULES

At this time, individual schedules are being arranged with the various employers in the Washington area. Since each employer operates differently, special

schedules are arranged which are mutually satisfactory to the student, the employer, and the School.

Generally, the student's schedule is arranged with the employer after he has successfully completed the first year of study. Many employers will require the student to work during the summer immediately following the freshman year. The student returns to the School for the sophomore year, working again during the second summer. Beginning with the third year, students alternate between employer and classroom each semester for the next two years, returning to the classroom for the fifth and final year. Schedules for transfer students are arranged on an individual basis according to the number of credit hours transferred and the employer's requirements.

Arrangements have been made or are in progress with many businesses, industrial organizations, and governmental agencies for employment opportunities.

COOPERATIVE PROGRAM WITH NAVY LABORATORIES

Arrangements have been made with the U.S. Naval Ship Research and Development Centers, Annapolis and Carderock, Md., and with other naval laboratories in which it is possible for the student to earn more than $13,500 on planned technical work assignments, obtain a Bachelor of Science degree in such areas as civil, electrical, or mechanical engineering, and be in a preferred position upon graduation to obtain a permanent Civil Service position with a grade and salary commensurate with the student's education and experience.

Tuition, textbooks, and fees (exclusive of room and board) up to 50 per cent may be granted on request. If tuition assistance is received, the cooperative student must agree to serve as a government civilian employee after graduation for a period equal to the period for which tuition is granted.

To participate in the program at the Naval laboratories, the student must be academically acceptable to the University and must meet the requirements of the Civil Service Commission for employment at these laboratories.

Work Experience.—This program integrates formal study at this School with practical work experience, an essential element of the educational process. The employment is related to the field of study in which the student is engaged, and it is diversified in order to afford breadth of experience. The work experience increases in difficulty and responsibility and, in general, parallels the student's progress through the academic phases of his program.

As a Civil Service employee, the co-op student is eligible for many federal benefits, including annual leave, sick leave, paid holidays, health benefits, and life insurance.

Freshman Admission.—Applications should be submitted during the fall term of the senior high school year. Students graduating at mid-term and wishing to begin study in the spring semester should apply no later than December 1.

Transfer Students Admission.—Transfer students from other institutions should submit application and required credentials prior to August 15 for the fall semester, December 15 for the spring semester, and May 1 for the summer sessions. The transfer student should be in good standing as to scholarship and conduct. He should be eligible to return to the last previously attended institution in the semester for which he seeks admission to this University.

Study-Work Schedule

		Grade	Annual Pay Scale
Preregistration Summer	Navy Laboratory	GS-2	$5,682
Freshman Year	George Washington University		
Summer	Navy Laboratory	GS-3	6,408
Sophomore Year	George Washington University		
Summer	Navy Laboratory	GS-4	7,198
Junior Year Fall	George Washington University		
Junior Year Extended, Spring, Summer, Fall	Navy Laboratory	GS-4	7,198
Junior Year Spring	George Washington University		
Summer	Navy Laboratory	GS-5	8,055
Senior Year	George Washington University		

For additional information, write to Manager, Cooperative Education, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

CONTINUING ENGINEERING EDUCATION

> The future of the engineering profession will depend to a considerable extent on the demonstrated competence of individual engineers to make optimum use of the latest scientific and technical knowledge in dealing with current and future problems. Participation in programs of continuing engineering studies will ensure that such competence can be maintained.*

The School of Engineering and Applied Science is meeting the need expressed above with a comprehensive program. The objective of the program is to enhance the competence of practicing engineers rather than to aid in their attainment of academic degrees. Tuition for the noncredit courses offered in the program is usually paid by the employers, who recognize the necessity for immediate improvement in the employee's on-the-job capability. Staff reorganizations have required many engineers to change their specialties or to take on additional duties within their present jobs; consequently, continuing engineering education is required to provide the skills necessary for these changes. Continuing engineering education also aids in qualifying for promotions.

The program presents about 90 noncredit courses each year. A number of them last for five days (30 classroom hours), while others last for two, three, four, or ten days. Some courses are presented in the evening (two-hour sessions once a week for ten to twelve weeks). In some courses, presentation of theory is augmented by workshops to give participants practice in the application of the particular discipline. Students from all over the nation and from Canada, Mexico, and England have participated in courses. Their variety of experience and background enhances the value of the discussions and enriches their relationships with each other and with their instructors.

Subjects which have been presented in this program include engineering management, system safety, air pollution control, engineering mathematics and statistics, solid waste management, structural dynamics, heat pipes, standards and calibration laboratories, laser technology, noise control, fracture and fatigue, technical writing, clinical engineering, antennas, communications systems

* American Society for Engineering Education, *Final Report: Goals of Engineering Education* (Washington, D.C.: January, 1968).

and ocean engineering. New courses are added as needs become apparent in various fields.

In addition to the faculty of the School of Engineering and Applied Science, outstanding lectures and instructors from other universities, from industry, and from government laboratories and agencies serve on the instructional staff of the program.

The program also offers noncredit contract courses off-campus specifically tailored for the needs and background of the engineers employed by a company or agency. Tuition for these courses is considerably lower than for those offered at the University.

To receive announcements or additional information on the program, write to Continuing Engineering Education Program, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

Administration

Harold Liebowitz, D.Ae.E., *Dean of the School of Engineering and Applied Science; Co-director of the Joint Institute for Acoustics and Flight Sciences*

Galip Mehmet Arkilic, Ph.D., *Assistant Dean of the School of Engineering and Applied Science*

Paul Arthur Crafton, Ph.D., *Chairman of the Department of Engineering Administration*

Alfred Martin Freudenthal, D.Sc., *Director of the Institute for the Study of Fatigue, Fracture, and Structural Reliability.*

Walter Kurt Kahn, D.E.E., *Chairman of the Department of Electrical Engineering and Computer Science*

William Henry Marlow, Ph.D., *Chairman of the Department of Operations Research; Director of the Institute for Management Science and Engineering*

John Edward Duberg, Ph.D., *Director of the NASA-Langley Graduate Program; Director of the Joint Institute for Acoustics and Flight Sciences*

I. Edward Garrick, B.S., *Assistant Director of the NASA-Langley Graduate Program*

Malcolm P. Clark, M.S., *Administrator of the NASA-Langley Graduate Program*

William Shanahan, B.S., *Manager of Engineering Admissions and Cooperative Education*

John Lindsey Whitesides, Jr., Ph.D., *Coordinator of the GWU-NASA Program, NASA-Langley Research Center*

John Witherspoon, M.S., *Assistant Administrator of the NASA-Langley Graduate Program*

Shao Wen Yuan, Ph.D., *Chairman of the Department of Civil, Mechanical, and Environmental Engineering; Coordinator of the NASA-Langley Graduate Program; Coordinator of the Joint Institute for Acoustics and Flight Sciences*

Jack Emerson Mansfield, B.S. in E.E., *Director of the Continuing Engineering Education Program*

Frederic A. Hooper, M.S., *Research and Resources Officer*

George Ellowitz, B.A., *Executive Associate to the Dean*

DEAN'S COUNCIL

Harold Liebowitz *(Chairman)*, Marvin Eisenberg, J.V. Foa, John Kaye

ACADEMIC CONSULTANT

Ernst Weber, Ph.D., *Chairman, Division of Engineering, National Research Council*

Advisory Council*

THE PURPOSES of the Advisory Council for the School of Engineering and Applied Science are to strengthen communication between the School and the other colleges, schools, and divisions of the University as well as between the School and the University's Board of Trustees; to advise on the programs of instruction, research, and service in the School and to help interpret these programs to the community and the nation; and to stimulate support for the continued development of the School and its programs.

MEMBERS OF THE COUNCIL FOR 1973–74

Chairman: Stephen R. Woodzell *(University Trustee), Former President of the Potomac Electric Power Company*
Raymond L. Bisplinghoff, *Deputy Director, National Science Foundation*
Bruno A. Boley, *Dean, Technological Institute, Northwestern University*
George M. Bunker, *President, Martin Marietta Corporation*
J.P. Chambers, *President, Melpar Division E-Systems, Inc.*
Moses Freedman, *Vice President, Blake Construction Company*
Alfred M. Freudenthal, *Professor of Civil and Materials Engineering*
Eugene G. Fubini, *Engineering Consultant*
Martin Goland, *President, Southwest Research Institute*
William J. Harris, Jr., *Vice President, Research and Test Department, Association of American Railroads*
Alexander Hassan, *Washington, D.C.*
Walter R. Hibbard, Jr., *Vice President, Research and Development, Owens Corning Fiberglas Corporation*
William Holt, *Carborundum Company, Niagara Falls, N.Y.*
William H. Marlow, *Chairman, Department of Operations Research*
Bernard A. Schriever, General USAF (Ret.), *Chairman of the Board, Schriever & McKee Associates, Inc.*
Arthur W. Sloan, *Chief Executive Officer, Susquehanna Corporation*
G.R. Tatum, *Vice President, Vitro Corporation*
Edward G. Uhl, *President, Fairchild-Hiller Corporation*
Ernst Weber, *Chairman, Division of Engineering, National Research Council*
Harold A. Wheeler, *Chief Scientist, Wheeler Laboratories, Inc.*
James F. Young, *Vice President—Engineering, General Electric Company*
L.A. Zadeh, *Chairman, Department of Electrical Engineering and Computer Sciences, University of California, Berkeley*

* The President of the University, the Vice President for Academic Affairs, and the Dean of the School of Engineering and Applied Science are ex officio members of the Advisory Council.

PROGRAMS OF STUDY AND COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES are listed programs of study, curricula, and courses of instruction offered by the School of Engineering and Applied Science.

Students who are not candidates for degrees but who wish to take courses offered by the School should apply for admission to the Division of University Students.

EXPLANATION OF COURSE NUMBERS

Courses numbered from 1 through 199 are planned for undergraduate credit, although certain courses may be taken for graduate credit when arrangements are approved in advance by the instructor and the Dean. Courses numbered 201 to 300 are planned for graduate credit and may in certain instances be taken by qualified undergraduate students. Courses numbered from 301 to 400 are primarily for doctoral students.

SEMESTER HOURS OF CREDIT

The number of semester hours credit given for the satisfactory completion of a course is indicated in parentheses after the name of the course. Thus, a year course giving three hours of credit each semester is marked (3–3), and a semester course giving three hours credit is marked (3). A semester hour consists of the completion of one fifty-minute period of class work or of one laboratory period a week for one semester.

TIME OF COURSE OFFERINGS

Following course descriptions is a parenthetical statement listing the semester for which the course is scheduled to be offered. The term "academic year" is used only with two-semester courses, and indicates that the first half of the course is to be offered in the fall semester and the second half in the spring semester; the term "as arranged" is used for courses which could not be scheduled at the time of printing this catalogue. Offerings for the summer sessions are not designated in this catalogue. Students should consult the *Summer Sessions Catalogue* or *Schedule of Classes* for summer offerings. A *Schedule of Classes* is also published for each fall and spring semester which provides more exact and up-to-date information concerning the time of course offerings.

KEY TO ABBREVIATIONS

The following abbreviations are used in this catalogue for course designations.

Acct	Accounting	**Engl**	English
Ap S	Applied Science	**Geol**	Geology
Chem	Chemistry	**Math**	Mathematics
CE	Civil Engineering	**ME**	Mechanical Engineering
CS	Computer Science	**OR**	Operations Research
Econ	Economics	**Phys**	Physics
EE	Electrical Engineering	**Soc**	Sociology
E Ad	Engineering Administration	**Stat**	Statistics
ES	Engineering Science	**U&RP**	Urban and Regional Planning

Applied Science

Interdepartmental offerings.

UNDERGRADUATE COURSES

57 Analytical Mechanics I (2)

First half of a one-year sequence. Concepts of statics, including force systems, equilibrium conditions, simple structures, distributed forces, shear and moments, friction and the concept of work, virtual work and stability. Prerequisite or concurrent registration: Ap S 113, Phys 2. (Fall)

58 Analytical Mechanics II (3)

Second half of a one-year sequence. Concepts of dynamics, including kinematics of particles, velocity and acceleration, Newton's laws of motion, momentum, work, kinetic energy, potential energy, central force fields, vibrations, resonance, dynamics of systems of particles, kinematics of a rigid body, dynamics of a rigid body. Introduction to Lagrangian-Hamiltonian formulation. Prerequisite: Ap S 57. (Spring)

113 Engineering Analysis I (3)

Analytical methods appropriate to the solution of engineering problems, including application of matrices and linear algebra, ordinary differential equations, vector calculus and integral theorems, complex algebra. Prerequisite: Math 32. (Fall and spring)

114 Engineering Analysis II (3)

Analytical methods appropriate to the solution of engineering problems, including application of Bessel functions, Legendre polynomials, Fourier series and integrals, Laplace transforms, partial differential equations in engineering and applied science. Prerequisite: Ap S 113. (Fall and spring)

115 Engineering Analysis III (3)

(Formerly Probabilistic and Statistical Methods in Engineering)

Solution of engineering problems using concepts from probability and statistics, including random variables, distribution functions, mathematical expectation, point and confidence interval estimation, hypothesis testing

correlation, and regression. This methodology applied to problems of structural design, bioengineering, manufacturing processes, product quality, equipment reliability, engineering management, and societal engineering. Prerequisite: Math 32. (Fall and spring)

GRADUATE COURSES

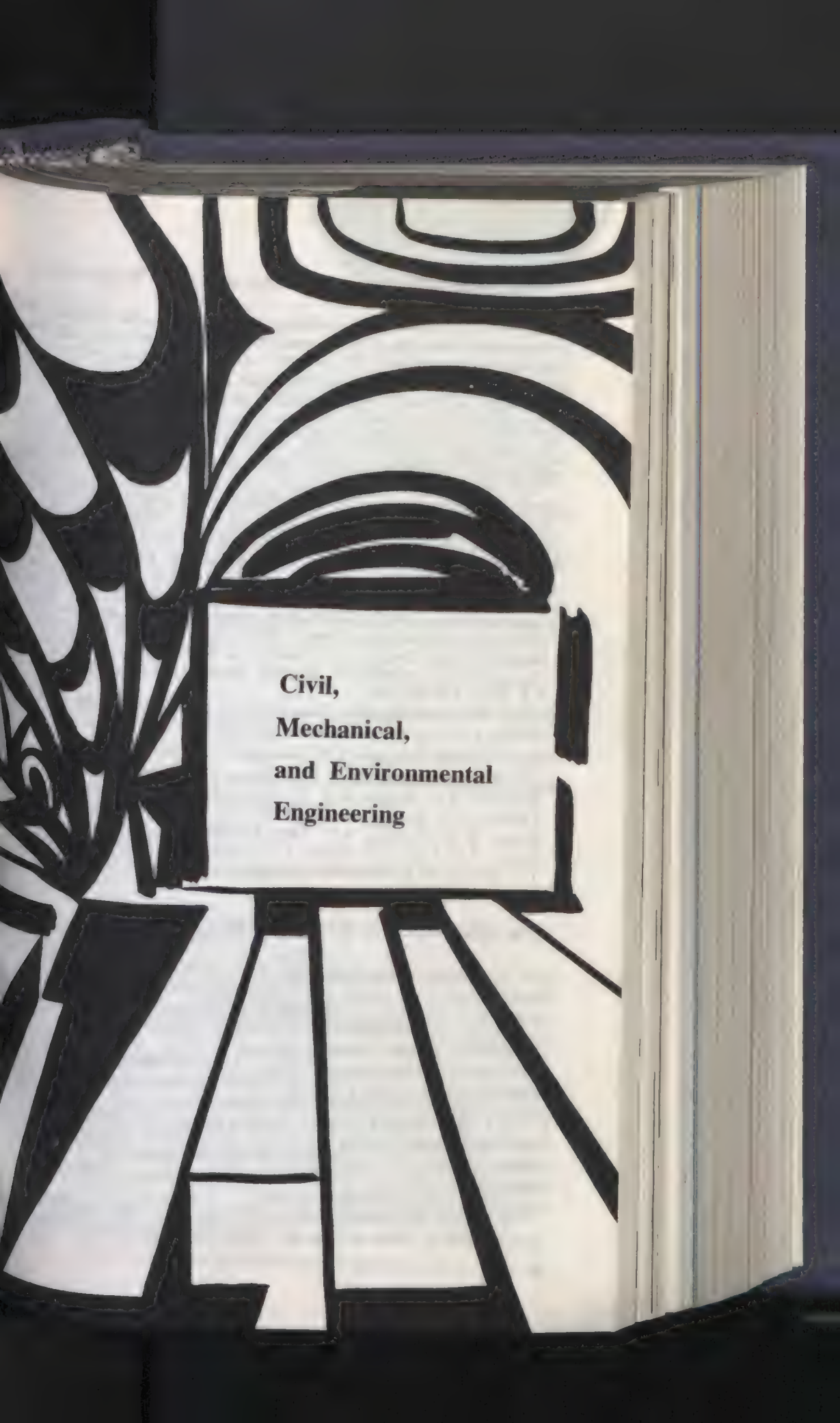
211 **Analytical Methods in Engineering I** (3)
(Formerly Mathematical Methods in Applied Science I)
Engineering applications of the theory of complex variables including contour integration, conformal mapping, inversion, integral, and boundary-value problems. Prerequisite: approval of Department. (Fall and spring)

212 **Analytical Methods in Engineering II** (3)
(Formerly Mathematical Methods in Applied Science II)
Analytical methods appropriate to the formulation of engineering problems including finite dimensional vector spaces, eigenvalue problems, generalized Fourier series, tensor calculus, curvilinear coordinates. Prerequisite: approval of Department. (Fall)

213 **Analytical Methods in Engineering III** (3)
(Formerly Mathematical Methods in Applied Science III)
Analytical techniques applied to engineering problems involving wave propagation, diffusion processes, and potential distributions. Prerequisite: approval of Department. (Fall and spring)

214 **Analytical Methods in Engineering IV** (3)
(Formerly Mathematical Methods in Applied Science IV)
Introduction to variational methods in engineering including Ritz and Galerkin approximation methods for boundary-value problems. Aspects of linear integral equations arising from engineering analysis. Prerequisite: approval of Department. (Spring)

215 **Special Topics in Engineering Analysis** (3)
(Formerly Mathematical Methods in Applied Science V)
Selected topics such as (1) perturbation techniques applied to approximate solution of nonlinear boundary- and initial-value problems in continuum mechanics; (2) advanced methods in the solution of boundary- and initial-value problems of engineering physics, including characteristics and Green's functions; or (3) singular integral equations with engineering applications. Prerequisite: approval of Department. (Spring)


Civil,
Mechanical,
and Environmental
Engineering

Civil, Mechanical, and Environmental Engineering

Professors C.H. Walther, G.M. Arkilic, R.R. Fox, Harold Liebowitz, A.M. Freudenthal, S.W. Yuan *(Chairman)*, Joseph Foa, J.E. Feir, A.B. Cambel *(Research)*, T.G. Toridis

Adjunct Professors D.P. Johnson, J.E. Duberg, I.E. Garrick, B.L. Clarkson, R.J. Seeger, A.A. Wolf, E.C. Kollman, Holt Ashley

Professorial Lecturers R.E. Fulton, R.R. Hunziker, Robert Wilson, Joseph Kirshner, M.P. Gaus, W.P. Reid, Robert Dillon, R.A. Hechtman, Charles Molloy, R.M. Sorensen, Walter Olstad, M.J. Queijo, R.P. Nalesnik, Otto Mayr, J.B. Scalzi, Philip Donely

Associate Professors John Eftis, B.I. Hyman, A.M. Kiper, J.S.W. Chi, A.K. Noor *(Research)*, Parmanand Mungur *(Research)*, M.K. Myers *(Research)*, D.L. Jones *(Research)*, J.L. Whitesides, Jr. *(Research)*

Associate Professorial Lecturers W.D. Erickson, R.W. Fralich, E.C. Yates, Jr., Michael Yachnis, Robert Perry, Nils Salvesen, T.W. Butler, J.D. Shaughnessy, Jaroslaw Sobieczcanski, Manuel Stein, R.H. Tolson, D.F. Bishop, Jr., Gajanan Sabnis, R.B. Samworth, Benjamin Whang, M.B. Barker, G.E. Lamphere, Nicholas Basdekas, Donald Ellison, J.B. Fisher, R.W. Barnwell, J.D. Buckley, Arthur Sosslau, R.J. Fisher, A.L. Burgett, Thomas McGean, F.C. Cheng, Duncan MacKinnon, Kenneth Saczalski, W.J. Gunn, T.M. Walsh, P.B. Buck, E.F. Skelton

Assistant Professors Charles Gilmore, J.C. Yu *(Research)*, A.M. Bloom *(Research)*, P.L. Coe, Jr. *(Research)*, Yishu Chin *(Research)*

Adjunct Assistant Professors B.W. Hannah, A.K. Trehan

Assistant Professorial Lecturers F.J. Hughes, J.A. Gorman, K.J. Perlman, L.E. Beckwith, R.L. Bowles, M.F. Card, J.C. Hardin, C.J. Jachimowski, H.A. Leybold, H.G. Reichle, Jr., J.B. Robertson, G.L. Smith, R.E. Brown, R.M. Brown, R.D. Matulka, R.Y. Ting, J.A. Belding, Jr., G.C. Canavos, J.E. Carter, R.L. Foye, C.E. Kirby, J.E. Lamar, R.C. Montgomery, S.K. Park, T.A. Straeter, W.E. Zorumski, Anthony Boiarski

CIVIL ENGINEERING—UNDERGRADUATE STUDY

Civil engineering encompasses those branches of engineering activities most closely related to the control and improvement of our environment and of the conditions of life. Study in this field prepares students for careers in the planning, design, and construction of buildings; bridges; roads; airports; rapid transportation systems; harbors; off-shore facilities; coastal protection structures; flood and pollution control systems for rivers, estuaries, and lakes; inland navigation systems; large power generation and flood control dams; water resources projects; urban renewal and development projects; and pollution control and waste disposal projects. It also provides the scientific and technological background required for careers in municipal engineering, urban and regional planning, environmental civil engineering, as well as for careers in engineering research in structural mechanics, ocean engineering, materials engineering, and industrialized housing.

The concern for environmental quality has led to the identification of numerous problem areas such as air, water, land, and noise pollution, among

others, which, in turn, has emphasized the need for "broad-gauged" engineering personnel who have been educated in a field of engineering and have a realistic understanding of the social, economic, and legal aspects of their professions. The flexibility in the civil engineering curriculum provided by the relatively large number of technical electives in the senior year allows students interested in contemporary urban problems to emphasize environmental aspects by branching off into an area of environmental civil engineering, or students interested in the use of computers to select an option which will prepare them for immediate careers in computing as well as graduate study in computer-dominated or computer-oriented professional fields.

The concentration of study outlined in the curriculum below provides the essentials for beginning a career upon graduation, for registration as a professional civil engineer as required by law, and for continuing study at the graduate level. The first four semesters are common to all undergraduate fields in the School; however, a student electing the environmental civil engineering option should select his humanities and social science electives with a view to his interest in environmental engineering (Sociology 126, *Urban Sociology*, must be included as one of his electives).

CORE CURRICULUM

Normally the first four semesters are common to all undergraduate fields in the School of Engineering and Applied Science.

First Semester

EE 51:	Applications of Computers (3)
Math 30:	Precalculus (3)
Math 31:	Calculus of One Variable (3)
Phys 1:	General Physics (4)
Elective:	Selected from humanities or social sciences (3)

Second Semester

EE 52:	Computers and Societal Problems (3)
or ES 4:	Descriptive Geometry and Drafting (3)
Engl 9 or 10:	English Composition: Language as Communication (3)
Math 32:	Calculus of Several Variables (3)
Phys 2:	Introduction to Modern Physics (4)
Elective:	Selected from humanities or social sciences (3)

Third Semester

Ap S 57:	Analytical Mechanics I (2)
Ap S 113:	Engineering Analysis I (3)
Ap S 115:	Engineering Analysis III (3)
Chem 13:	General Chemistry (4)
Elective:	Selected from humanities or social sciences (3)

Fourth Semester

Ap S 58:	Analytical Mechanics II (3)
Ap S 114:	Engineering Analysis II (3)
CE 110:	Introduction to Environmental Engineering (3)

or EE 11:	Linear Networks I (3)
CE 140:	Materials Science (3)
Phys 32:	Introduction to Theoretical Physics (3)
Elective:	Selected from humanities or social sciences (3)

CIVIL ENGINEERING CURRICULUM

Fifth Semester

CE 120:	Introduction to the Mechanics of Solids (4)
CE 123:	Structural Theory (6)
CE 166:	Materials Engineering (2)
CE 167:	Mechanics of Materials Laboratory (1)
ME 131:	Thermodynamics (3)

Sixth Semester

CE 183:	Urban Planning (3)
CE 190:	Legal and Economic Aspects of Engineering (2)
Geol 136:	Engineering Geology (3)
ME 126:	Fluid Mechanics (3)
Elective:	Selected from humanities or social sciences (6)

Seventh Semester

CE 168:	Introductory Soil Mechanics (3)
CE 191:	Metal Structures (3)
CE 193:	Hydraulics (3)
CE 194:	Environmental Engineering I: Water Supply and Resources (3)
CE 195:	Hydrology (3)
Elective:	Technical elective (3)

Eighth Semester

CE 182:	Foundation Engineering (2)
CE 185:	Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192:	Reinforced Concrete Structures (3)
CE 196:	Design and Cost Analysis of Civil Engineering Structures (3)
CE 197:	Environmental Engineering II: Waste and Pollution Control (3)
Elective:	Technical elective (2)

Technical Electives

CE 186:	Advanced Mechanics of Solids (3)
CE 201:	Design of Metal Structures (3)
CE 202:	Design of Reinforced Concrete Structures (3)
CE 215:	Urban Construction Technology (3)
CE 216:	Hydrology (3)
CE 220:	Urban Transportation Engineering (3)
CE 253:	Failure and Reliability Analysis of Engineering Structures (3)
CE 256:	Introduction to Ocean and Coastal Engineering (3)
E Ad 150:	Introduction to Technical Management (3)
ES 234:	Composite Materials (3)
*Geol 189:	Geophysics of the Solid Earth (2)

*For Geology course description, see the *Undergraduate and Graduate Catalogue*.

COMPUTER-ORIENTED CIVIL ENGINEERING OPTION

The rapidly expanding use of computers in the design and control of engineering systems provides increasing opportunities for engineering careers in which, upon graduation, a high degree of proficiency and ease in the extensive and sophisticated use of digital and other computers is essential. This program therefore replaces the technical electives of the principal professional undergraduate program with electives that provide comprehensive exposure to computer applications to the solution of problems of civil engineering. It prepares the student for immediate careers as well as for graduate study in computer-dominated or computer-oriented professional fields.

CURRICULUM

Prerequisite: first four semesters as described in the Core Curriculum, see pages 47–48.

Fifth Semester

CE 120: Introduction to the Mechanics of Solids (4)
CE 123: Structural Theory (6)
CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
ME 131: Thermodynamics (3)

Sixth Semester

CE 183: Urban Planning (3)
CE 190: Legal and Economic Aspects of Engineering (2)
Geol 136: Engineering Geology (3)
ME 126: Fluid Mechanics (3)
Elective: Selected from humanities or social sciences (6)

Seventh Semester

CE 168: Introductory Soil Mechanics (3)
CE 191: Metal Structures (3)
CE 193: Hydraulics (3)
CE 194: Environmental Engineering I: Water Supply and Resources (3)
Elective: Technical electives (6)

Eighth Semester

CE 182: Foundation Engineering (2)
CE 185: Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192: Reinforced Concrete Structures (3)
CE 196: Design and Cost Analysis of Civil Engineering Structures (3)
Elective: Technical elective (5)

Technical Electives

CE 197: Environmental Engineering II: Waste and Pollution Control (3)
CE 210: Methods of Structural Analysis (3)
CS 278: Analog and Hybrid Computers (3)

EE 152:	Introduction to Digital Computers (3)
ES 282:	Computer-aided Design (3)
ES 283:	Application of Computer Graphics in Engineering (3)
ES 284:	Numerical Methods in Engineering (3)
*Geol 189:	Geophysics of the Solid Earth (2)

ENVIRONMENTAL CIVIL ENGINEERING OPTION

Environmental civil engineering is concerned with the study of the problems in environmental quality—air, water, land, noise, transportation, urban renewal, etc.—that affect the life, development, and behavior of the individual as well as society. One of the goals of this program is to provide the student with the essentials for beginning a career upon graduation so that he may be in a position to contribute to the solutions of the problems related to the improvement of environmental quality. The program provides study of a comprehensive cross section of several fields of civil engineering—structures, materials, hydraulics, transportation, waste control—combined with allied fields in urban and regional planning, legal and legislative practices, and the social sciences which emphasize environmental aspects. The curriculum prepares the student for graduate study or for a career in environmental civil engineering.

CURRICULUM

Prerequisite: first four semesters as described in the Core Curriculum, see pages 47–48.

Fifth Semester

CE 120:	Introduction to the Mechanics of Solids (4)
CE 123:	Structural Theory (6)
CE 166:	Materials Engineering (2)
CE 167:	Mechanics of Materials Laboratory (1)
ME 131:	Thermodynamics (3)

Sixth Semester

CE 183:	Urban Planning (3)
CE 190:	Legal and Economic Aspects of Engineering (2)
Geol 136:	Engineering Geology (3)
ME 126:	Fluid Mechanics (3)
Elective:	Selected from humanities or social sciences (6)

Seventh Semester

CE 168:	Introductory Soil Mechanics (3)
CE 191:	Metal Structures (3)
CE 193:	Hydraulics (3)
CE 194:	Environmental Engineering I: Water Supply and Resources (3)
CE 195:	Hydrology (3)
Elective:	Technical elective (3)

*For Geology course description, see the *Undergraduate and Graduate Catalogue.*

Eighth Semester

CE 182: Foundation Engineering (2)
CE 185: Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192: Reinforced Concrete Structures (3)
CE 196: Design and Cost Analysis of Civil Engineering Structures (3)
CE 197: Environmental Engineering II: Waste and Pollution Control (3)
Elective: Technical elective (2)

*Technical Electives**

B Sc 11–12: Introductory Biology for Science Majors (4–4)
Chem 50: Introduction to Organic Chemistry (4)
CE 212: Engineering Climatology (3)
CE 215: Urban Construction Technology (3)
CE 216: Hydrology (3)
CE 220: Urban Transportation Engineering (3)
CE 256: Introduction to Ocean and Coastal Engineering (3)
CE 276: Water Resources Planning and Control (3)
E Ad 150: Introduction to Technical Management (3)
Geol 181: General Oceanography (3)
Geol 189: Geophysics of the Solid Earth (2)
Geol 241: Geochemistry (3)
ME 176: Environmental Engineering Problems (3)
†Soc 126: Urban Sociology (3)
U&RP 201: Introduction to Urban Planning (3)
U&RP 207: Land Development Planning (3)
U&RP 208: Urban Transportation Planning (3)

IVIL ENGINEERING UNDERGRADUATE COURSES

110 **Introduction to Environmental Engineering** (3)

Chemistry of natural water as it affects hardness, alkalinity, corrosion, and carbonate balance. Water treatment chemistry, softening, coagulation, and flocculation. Chemistry of rivers, oxygen balance, nitrogen cycle, carbon cycle, eutrophication. Waste water treatment. Removal of dissolved organic material, nitrogen, phosphorous, and chlorination. Classification of organic and inorganic air pollutants. Chemical reaction and formation of secondary air pollutants. Chemical analysis of inorganic pollutants; fluorides, oxides of nitrogen, sulfates, chlorides, sulfur compounds, oxides of carbon, and oxidants. Chemical analysis of organic pollutants; aliphatic hydrocarbons. Control of pollutant emission by absorption, adsorption, and combustion. Prerequisite: Chem 13, Phys 2. (Spring)

120 **Introduction to the Mechanics of Solids** (4)

Three-dimensional strain and stress. Constitutive equations for elastic, viscoelastic, and plastic materials. Axial load, bending and torsion of struts and beams. Instability and failure. Prerequisite: Ap S 58. (Fall)

*or Biological Sciences, Chemistry, Geology, and Urban and Regional Planning course descrip-
s, see the Undergraduate and Graduate Catalogue.*
ociology 126 must be included as one of the electives during the first year of study.

123 **Structural Theory** (6)

Theory of determinate and indeterminate structures using both classical and modern approaches. Prerequisite or concurrent registration: CE 120 (Fall)

140 **Materials Science** (3)

Electron structure of atoms; atomic and molecular bonding; energy bands; crystal structure; imperfections; noncrystalline solids; reaction rates; diffusion; transport phenomena—thermal conductivity, electrical conduction; semiconductors; magnetism; elasticity and anelastic phenomena; microplasticity; plastic deformation; fracture. Prerequisite or concurrent registration: Ap S 114, Phys 32. (Spring)

166 **Materials Engineering** (2)

Mechanical properties and their description; effect of microstructure on the mechanical behavior of metals, ceramics, polymers, and polyphase materials; effect of strain-rate and temperature; creep, fatigue, and fracture; effect of surface and environment; materials evaluation for structural performance. Prerequisite: CE 120, 140; or approval of Department. (Fall)

167 **Mechanics of Materials Laboratory** (1)

Measurement of strains and study of failure resulting from applied forces. Ductile, brittle, anisotropic, elastomeric and plastic materials; tension, compression, bending, creep, and fatigue loading. Prerequisite or concurrent registration: CE 166. (Fall)

168 **Introductory Soil Mechanics** (3)

Engineering properties of soils; analysis of lateral earth pressures, bearing capacity, foundations, and slope stability. Prerequisite: CE 120, ME 126. (Fall)

182 **Foundation Engineering** (2)

Subsurface exploration, design of shallow foundations, design of pile foundations, earth-retaining structures. Prerequisite: CE 168. (Spring)

183 **Urban Planning** (3)

Engineering aspects of urban planning, including transportation, water supply and sewerage, public utilities, safety and convenience, and natural environment. (Spring)

185 **Soil Mechanics and Foundation Engineering Laboratory** (1)

Laboratory experiments for the classification, strength, compressibility, and general engineering properties of soils. Prerequisite: CE 168. (Spring)

186 **Advanced Mechanics of Solids** (3)

Constitutive equations, elastic, viscoelastic, elastic-plastic, and viscoplastic response. Beam theory, eccentric bending, buckling, torsion. Failure criteria and failure mechanisms. Prerequisite: CE 120, 166, 167. (As arranged)

190 **Legal and Economic Aspects of Engineering** (2)

Laws relating to engineering practice, preparation of contract documents and specifications, consideration of economic factors in engineering design decisions. (Spring)

191 **Metal Structures** (3)

Principles of the design of metal structures; structural elements; connections; specific problems of analysis; methods of construction. (Fall)

192 **Reinforced Concrete Structures** (3)

Principles of the design of reinforced concrete structures. Details of reinforcement of structural elements. Monolithic structures, precast elements, methods of construction. (Spring)

193 **Hydraulics** (3)

(Formerly Hydraulics and Hydrology)

Fluid statics: applications to calculation of boundary forces in a static fluid, buoyancy, and flotation. Application of kinematic principles; flow fields, stream tubes, and flow nets. Fluid dynamics: applications to pipe flow, hydraulic models, measurement of pressure, and velocity. Open channel flow: applications to water resources engineering. Prerequisite: ME 126. (Fall)

194 **Environmental Engineering I: Water Supply and Resources** (3)

Planning and design of water supply and waste-water disposal systems. Water quality control and treatment processes. Desalination, stream pollution control. Prerequisite: CE 193 and senior status. (Spring)

195 **Hydrology** (3)

Descriptive hydrology: hydrologic cycle, precipitation, stream flow, evaporation, and transpiration. Quantitative hydrology: hydrograph analysis, estimating volume of runoff, runoff from snow, hydrographs of basin outflow, storage routing. Probability concepts in hydrology: flood frequency, rainfall frequency, drought, stochastic hydrology. Prerequisite: Ap S 115, ME 125. (Fall)

196 **Design and Cost Analysis of Civil Engineering Structures** (3)

Design of civil engineering structures such as wharves, piers, bulkheads, water treatment reactors, tunnels, dams, highway bridge and drainage systems. (Spring)

197 **Environmental Engineering II: Waste and Pollution Control** (3)

Disposal of sewage, biological treatment, chemical treatment, filtration, activated sludge, sludge handling and disposal. Control of industrial wastes and of nuclear waste products. Solid waste disposal. Prerequisite: senior status. (Fall)

198 **Research** (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

MECHANICAL ENGINEERING—UNDERGRADUATE STUDY

Mechanical engineering is primarily concerned with physical systems in mo-
ion. A mechanical engineer is concerned with the conversion, transfer, and
ontrol of energy from its source to its moving system. He has contributed to
ur present technology in every industry and in every phase of research, de-

sign, development, and production. Land and marine vehicles, transportation systems, air-conditioning systems, nuclear reactors and fuel cells, low-pollution control devices, and a host of other devices lie in his domain. His training should provide him with the ability to formulate problems based on fundamental laws of nature, to recognize the types of methods which are applicable to their solution, to read with understanding the relevant work, and to come up with a usable answer. The mechanical engineering curriculum provides a background for careers in research, design, development, and manufacture in a wide variety of industries.

Course offerings in the field of mechanical engineering, which begin with a broad foundation in physics, chemistry, mathematics, humanities, and social sciences, consist of studies in basic mechanics of solids and fluids, electricity and electronics, material sciences, dynamic analysis, thermal sciences, energy conversion and power, environmental control, and the design of machines and systems and their control. Furthermore, technical electives in the senior year allow students interested in the use of computers to select an option which will prepare them for immediate careers in computing as well as graduate study in computer-dominated or computer-oriented professional fields. The program of study outlined below is based on the concept that the mechanical engineer must be prepared to meet the challenge of ever-increasing technical, economic, and social problems.

Graduates are qualified for professional positions in design, analysis, manufacture, and application of machines, process, and control, or in research and development, as well as for graduate work.

CORE CURRICULUM

Normally the first four semesters are common to all undergraduate fields in the School of Engineering and Applied Science.

First Semester

EE 51:	Applications of Computers (3)
Math 30:	Precalculus (3)
Math 31:	Calculus of One Variable (3)
Phys 1:	General Physics (4)
Elective:	Selected from humanities or social sciences (3)

Second Semester

ES 4:	Descriptive Geometry and Drafting (3)
Engl 9 or 10:	English Composition: Language as Communication (3)
Math 32:	Calculus of Several Variables (3)
Phys 2:	Introduction to Modern Physics (4)
Elective:	Selected from humanities or social sciences (3)

Third Semester

Ap S 57:	Analytical Mechanics I (2)
Ap S 113:	Engineering Analysis I (3)
Ap S 115:	Engineering Analysis III (3)
Chem 13:	General Chemistry (4)
Elective:	Selected from humanities or social sciences (3)

Fourth Semester

Ap S 58: Analytical Mechanics II (3)
Ap S 114: Engineering Analysis II (3)
CE 140: Materials Science (3)
EE 11: Linear Networks I (3)
Phys 32: Introduction to Theoretical Physics (3)
Elective: Selected from humanities or social sciences (3)

MECHANICAL ENGINEERING CURRICULUM

Prerequisite: first four semesters as described in the Core Curriculum, see pages 54–55.

Fifth Semester

CE 120: Introduction to the Mechanics of Solids (4)
CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
ME 131: Thermodynamics (3)
ME 134: Introduction to Vibration Analysis (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 20: Introductory Engineering Electronics (3)
EE 172: Control Systems (3)
ME 120: Methods of Engineering Experimentation (2)
ME 126: Fluid Mechanics (3)
ME 148: Thermodynamic Analysis (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

ME 155: Compressible Fluid Flow (3)
ME 176: Environmental Engineering Problems (3)
ME 187: Heat Transfer Theory (3)
ME 190: Mechanisms, Analysis and Synthesis (3)
ME 191: Mechanical Design (3)
Elective: Technical elective (3)

Eighth Semester

ME 152: Mechanical Engineering Laboratory (2)
ME 193: Engineering Systems Design (3)
ME 194: Energy Conversion (3)
Elective: Technical electives (6)

Technical Electives

CE 197: Environmental Engineering II: Waste and Pollution Control (3)
E Ad 150: Introduction to Technical Management (3)
E Ad 160: Introduction to Engineering Economic Analysis (3)
ES 251–52: Transportation (3–3)
ME 161: Advanced Dynamics (3)
ME 171: Mechanics of Deformable Solids I (3)

ME 215:	Theory of Vibrations (3)
ME 221:	Intermediate Fluid Mechanics (3)
ME 225:	Turbomachinery I (3)
ME 237:	Propulsion I (3)
ME 240:	Kinematic Synthesis (3)
ME 247:	Fluidics (3)

COMPUTER-ORIENTED MECHANICAL ENGINEERING OPTION

The rapidly expanding use of computers in the design and control of engineering systems provides increasing opportunities for engineering careers in which, upon graduation, a high degree of proficiency and ease in the extensive and sophisticated use of digital and other computers is essential. This program therefore replaces the technical electives of the principal professional undergraduate program with electives that provide comprehensive exposure to computer applications to the solution of all problems of mechanical engineering. It prepares the student for immediate careers as well as for graduate study in computer-dominated or computer-oriented professional fields.

CURRICULUM

Prerequisite: first four semesters as described in the Core Curriculum, see pages 54–55.

Fifth Semester

CE 120:	Introduction to the Mechanics of Solids (4)
CE 166:	Materials Engineering (2)
CE 167:	Mechanics of Materials Laboratory (1)
ME 131:	Thermodynamics (3)
ME 134:	Introduction to Vibration Analysis (3)
Elective:	Selected from humanities or social sciences (3)

Sixth Semester

EE 20:	Introductory Engineering Electronics (3)
EE 172:	Control Systems (3)
ME 120:	Methods of Engineering Experimentation (2)
ME 126:	Fluid Mechanics (3)
ME 148:	Thermodynamic Analysis (3)
Elective:	Selected from humanities or social sciences (3)

Seventh Semester

ME 155:	Compressible Fluid Flow (3)
ME 187:	Heat Transfer Theory (3)
ME 190:	Mechanisms, Analysis and Synthesis (3)
ME 191:	Mechanical Design (3)
Elective:	Technical electives (6)

Eighth Semester

ME 152:	Mechanical Engineering Laboratory (2)
ME 193:	Engineering Systems Design (3)
ME 194:	Energy Conversion (3)
Elective:	Technical electives (6)

Technical Electives

CS 278: Analog and Hybrid Computers (3)
EE 152: Introduction to Digital Computers (3)
EE 157: Machine and Assembly Language Programming (3)
ES 282: Computer-aided Design (3)
ES 283: Application of Computer Graphics in Engineering (3)
ES 284: Numerical Methods in Engineering (3)

ENERGY RESOURCES AND POWER OPTION

The energy resources and power option in mechanical engineering is concerned with the study of energy resources and the means of practical and economical conversion of the various forms of energy to mechanical and electrical power. Expanding demand for energy and power and the shortage of certain energy resources have confronted mechanical enigineers with new and challenging problems. The basic objective of this program is to provide the student with essential background to contribute professionally to the solution of these problems. The program provides study of a comprehensive cross-section of several fields of mechanical engineering (creative design, materials, fluids, heat transfer, and energy conversion—combined with allied fields in electrical, transportation, and environmental control engineering). The curriculum prepares the student for graduate study as well as for a career in energy resources and power engineering.

CURRICULUM

Prerequisite: first four semesters as described in the Core Curriculum, see pages 54–55.

Fifth Semester

CE 120: Introduction to the Mechanics of Solids (4)
CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
ME 131: Thermodynamics (3)
ME 134: Introduction to Vibration Analysis (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 20: Introductory Engineering Electronics (3)
EE 172: Control Systems (3)
ME 120: Methods of Engineering Experimentation (2)
ME 126: Fluid Mechanics (3)
ME 148: Thermodynamic Analysis (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

EE 177: Electrical Energy Conversion (3)
ME 155: Compressible Fluid Flow (3)
ME 187: Heat Transfer Theory (3)
ME 190: Mechanisms, Analysis and Synthesis (3)
ME 191: Mechanical Design (3)
Elective: Technical elective (3)

Eighth Semester

ME 152:	Mechanical Engineering Laboratory (2)
ME 193:	Engineering Systems Design (3)
Elective:	Technical electives (9)

Technical Electives

E Ad 150:	Introduction to Technical Management (3)
E Ad 160:	Introduction to Engineering Economic Analysis (3)
ME 176:	Environmental Engineering Problems (3)
ME 194:	Energy Conversion (3)
ME 224:	Fundamentals of Combustion Engines (3)
ME 225:	Turbomachinery I (3)
ME 237:	Propulsion I (3)
ME 260:	Heating, Refrigeration, and Air Conditioning (3)
ME 282:	Energy Technology (3)
ME 283:	Nuclear Reactor Engineering (3)
ME 291:	Power Systems (3)

MECHANICAL ENGINEERING UNDERGRADUATE COURSES

120 Methods of Engineering Experimentation (2)

Acquisition and analysis of experimental data. Laws of modeling and simulation. Report formulation and presentation. Basic principles of various measuring instruments and sensors. Laboratory experiments, including use of strain gages, oscilloscopes, various tranducers, etc. Introduction to basic experimental techniques related to dynamics, fluid flow, and thermal sciences. Prerequisite: CE 120, ME 131. (Spring)

126 Fluid Mechanics (3)

Fluid properties, regimes in fluid mechanics, fluid statics, fluid kinematics, basic equations, one- and two-dimensional inviscid incompressible flow, viscous incompressible flow, dimensional method. Prerequisite: Ap S 55. (Spring)

131 Thermodynamics (3)

Fundamental thermodynamic concepts, Zeroth law of thermodynamics and temperature measurements, work and heat, first law of thermodynamics, properties of pure substances, first-law analysis of some thermodynamic systems, second law of thermodynamics, reversibility, entropy, second-law analysis of thermodynamic systems. Prerequisite or concurrent registration: Ap S 58. (Fall)

134 Introduction to Vibration Analysis (3)

Natural frequencies and response of single- and multiple-degree of freedom mechanical systems to dynamic loads. Effect of damping, transient and steady-state analysis. Prerequisite: Ap S 58. (Fall)

148 Thermodynamic Analysis (3)

Analysis of thermodynamic power and refrigeration cycles; thermodynamics of mixtures of substances; properties of air-water vapor mixtures, psychrometry and analysis of cooling tower and air-conditioning plant; third law of thermodynamics and absolute entropy; evaluation of combustion processes. Molecular distributions and models; introduction to statistical and quantum mechanics; statistical thermodynamics and thermodynamic properties of gases and solids. Prerequisite: ME 131. (Spring)

152 Mechanical Engineering Laboratory (2)

Experimental study of various engineering systems. Laboratory projects include experimental design, modeling and simulation parameters, data acquisition, and report presentation techniques. Prerequisite: ME 120. (As arranged)

155 Compressible Fluid Flow (3)

Introduction to compressible flow, basic equations, propagation of motion in compressible fluids, isotropic-flow relations, steady one-dimensional flow, wave phenomena, small perturbation theory, slender-body theory, method of characteristics. Prerequisite: ME 126, 131. (Fall)

161 Advanced Dynamics (3)

Rigid-body dynamics and Euler's equations. Balancing of rotating shafts; analysis of spinning tops and gyroscopes; evaluation of dynamic forces in machines. Lagrange's equations for particles, rigid bodies, and systems. Prerequisite: ME 134. (Fall)

171 Mechanics of Deformable Solids I (3)

Fundamentals of stress analysis of elastic bodies. Stresses in thick-walled cylinders; torsion of shafts of arbitrary cross-section; shear stresses in thin-walled tubes; stress and deflection analysis of complex systems; stress concentration; impact. Prerequisite: CE 120. (Fall)

172 Mechanics of Deformable Solids II (3)

Yield criteria, theories of plastic deformation. Elastic-plastic analysis in bending and torsion. Thick-rolled cylinders, shakedown theorems, residual stresses. Basic concepts of slip-line theory. Fundamentals of creep analysis. Introduction to ASME Boiler and Pressure Vessel Code. Prerequisite: ME 171. (Spring)

176 Environmental Engineering Problems (3)

Classification and effects of air pollutants; air-quality criteria and standards; analysis of pollutants; sources of pollutants and emission inventory; emission-control equipment. Water-quality standards; sewage and industrial waste characterization and pollutional effects in natural waters; primary, biological, and tertiary treatment of wastes; sludge handling and disposal. Prerequisite: senior status. (Fall)

187 Heat Transfer Theory (3)

Heat transfer processes. General heat conduction equations; steady- and unsteady-state heat conduction problems. Methods of analysis; analytical, analog, and numerical solution methods. Fundamentals of convective-heat transfer. Evaluation of convective-heat transfer coefficients; dimensional analysis, boundary-layer approach, analogy between heat and momentum transfer. Energy exchange by thermal radiation; fundamental concepts and laws, radiation properties, radiative-heat transfer between surfaces. Design considerations; heat-exchanger design and selection. Prerequisite: ME 126. (Fall)

190 Mechanisms, Analysis and Synthesis (3)

Kinematics and dynamics of mechanisms. Displacement, velocities, accelerations in linkage and cam systems by analytical and graphical methods. Prerequisite Ap S 58. (Fall)

191 Mechanical Design (3)

Introduction to design concept, selection of materials, and strength of mechanical elements; design of machine components such as shafts, springs, bearings, gears, couplings, screws, and related mechanical components. Prerequisite: senior status. (Fall)

193 Engineering Systems Design (3)

Principles of creative design and system-design concept. Engineering economics, modeling and simulation of physical systems, optimization techniques. Analog and digital computer-aided design methods. Special design projects which may integrate with ME 152 *Mechanical Engineering Laboratory* projects. Prerequisite: ME 191. (Spring)

194 Energy Conversion (3)

Energy resources of the earth; energy, society, and the national economy; issue of energy and the environment, future outlook for energy supply and demand. Conversion of energy; fundamental principles and technological options, efficiency of different energy converters. Current technologies and longer-range possibilities. Generation of electricity, trends in the electricity industry; nuclear power systems—growth, economic, and environmental impacts. Unconventional methods of power generation; direct energy conversion. Prerequisite: EE 20, ME 148. (Spring)

198 Research (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

ENGINEERING SCIENCE—UNDERGRADUATE COURSE

4 Descriptive Geometry and Drafting (3)

Introductory descriptive geometry. Use of equipment. Points, lines, curves, planes, and surfaces; principal, auxiliary, and orthographic views, isometric views, intersection of surface. Technical sketching, dimensioning and precision, machine elements. Detail and assembly drawings. Structural elements. Layout and fabrication drawings, pipe and electric prints. (Spring)

GRADUATE STUDY

Dynamic developments in science and technology in decades to come will require that the engineer keep pace with newly emerging technological disciplines, as well as with new techniques in analysis, design, and computation. Under these circumstances, it is evident that graduate education in advanced technology will assume a vital responsibility in answering the needs of a technologically oriented society. Amidst the proliferation of knowledge and technological specialty, the School adheres to the principle that versatility and depth in scientific fundamentals should be the characteristic features of any graduate

program of study that attempts to prepare the graduate student to cope with the engineering developments of today and of the future.

The Department of Civil, Mechanical, and Environmental Engineering offers graduate programs of study in the various areas of concentration in the professional disciplines of civil and mechanical engineering. Its professional as well as basic interdisciplinary programs encompass the broad areas of solid mechanics, structural engineering, geotechnics and foundation engineering, ocean and marine engineering, public works engineering, urban environmental engineering, risk assessment and assurance technology, computer-aided structural design, flight sciences, mechanical engineering design, environmental control, energy and power, transportation engineering, thermal sciences, materials engineering, hydromechanics, fluid mechanics, and aerospace engineering. Within these broad categories are basic programs of study and research in the elasticity, inelasticity, and fracture of solids; the mechanics of continua; the structure and properties of materials; the theory of plates, shells, and elastic stability; advanced structural analysis and design, including structural reliability; structural dynamics; soil mechanics; classical and statistical thermodynamics; heat and mass transfer; energy conversion; combustion processes; incompressible, compressible, laminar, viscous, turbulent, hypersonic, and nonsteady flows; hydrodynamics and oceanography; gas dynamics and reaction kinetics; analytical and nonlinear mechanics; advanced dynamics; atmospheric space flight and celestial mechanics; dynamic stability of flight structures; propulsion systems; and aerothermochemistry. As part of the interdisciplinary program, students elect approved courses from other departments of the School of Engineering and Applied Science, as well as from other schools and divisions of the University. Depending upon the interest of the student, some of the programs leading to the degrees of Master of Science and (by special permission of the appropriate department chairman) Doctor of Science are given at the NASA-Langley Research Center, Langley Station, Hampton, Va. NASA-Langley's extensive scientific and engineering facilities and equipment are utilized whenever feasible. Arrangements can also be made to use the facilities and equipment of the Naval Ship Research and Development Center, Annapolis and Carderock, Md., where off-campus Master's degree programs have been initiated.

Each program is arranged to fit the individual needs and interests of the graduate student, and at the same time to utilize effectively his previous experience and background. This background should normally include an undergraduate degree in engineering, the physical sciences, or applied mathematics. Each graduate student is assigned a faculty adviser on the basis of his study interests, thereby enabling a close student-faculty relationship to develop during the course of his program.

FIELDS AND AREA OF CONCENTRATION

Programs of study in any field of concentration will generally include courses from appropriate allied areas.

Acoustics*

Ap S 211: Analytical Methods in Engineering I
Ap S 213: Analytical Methods in Engineering III

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

Ap S 215:	Special Topics in Engineering Analysis
*ES 203–4:	Probability and Statistics of Metrology
ES 270:	Introduction to Acoustics
*ES 271:	Random Process Theory I
*ES 272:	Random Process Theory II
*ES 273:	Time Series Analysis
ES 274:	Noise and Vibration Control
*ES 275:	Advanced Theoretical Acoustics
*ES 276:	Acoustical and Mechanical Measurements
*ES 277:	Physical Acoustics
*ES 278:	Psychological and Physiological Acoustics
*ES 279:	Human Factors in Engineering
*ES 280:	Special Topics in Acoustics
ES 298:	Research
ES 299–300:	Thesis Research
*ES 310:	Aeroacoustics
*ES 311:	Nonlinear Acoustics
*ES 312:	Theory of Random Vibration
*ES 313:	Structural Acoustic Interaction
ES 398:	Advanced Reading and Research
ES 399:	Dissertation Research
ME 215:	Theory of Vibrations
ME 216:	Structural Dynamics
ME 221:	Intermediate Fluid Mechanics
ME 312:	Theory of Turbulence

Aerospace Engineering*

Ap S 211:	Analytical Methods in Engineering I
Ap S 212:	Analytical Methods in Engineering II
Ap S 213:	Analytical Methods in Engineering III
Ap S 214:	Analytical Methods in Engineering IV
Ap S 215:	Special Topics in Engineering Analysis
*ES 263:	Atmospheric Physics for Engineers
*ES 273:	Time Series Analysis
ME 221:	Intermediate Fluid Mechanics
ME 222:	Applied Fluid Dynamics
ME 235:	Compressible Flow
*ME 248:	Seminar: Aircraft Design
ME 275:	Stability and Control of Vehicles
*ME 276:	Mechanics of Space Flight
*ME 283:	Nuclear Reactor Engineering
ME 298:	Research
ME 299–300:	Thesis Research
ME 398:	Advanced Reading and Research
ME 399:	Dissertation Research

Computer-oriented Engineering Design†

Ap S 211:	Analytical Methods in Engineering I
Ap S 212:	Analytical Methods in Engineering II
Ap S 213:	Analytical Methods in Engineering III
Ap S 214:	Analytical Methods in Engineering IV
Ap S 215:	Special Topics in Engineering Analysis

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.
† Offered at NASA-Langley Research Center as Computer-aided Structural Design.

CE 210: Methods of Structural Analysis
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Engineering
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability
EE 157: Machine and Assembly Language Programming
ES 221: Theory of Elasticity I
ES 282: Computer-aided Design
ES 283: Application of Computer Graphics in Engineering
ES 284: Numerical Methods in Engineering
ES 285: Finite Element Methods in Engineering Mechanics
*ES 286: Analysis and Design of Thin-walled Structures
*ES 287: Automated Design of Complex Structures
ES 299–300: Thesis Research
ES 398: Advanced Reading and Research
ES 399: Dissertation Research
ME 215: Theory of Vibrations
ME 216: Structural Dynamics
OR 251: Linear Programming

Environmental Control

Ap S 213: Analytical Methods in Engineering III
CE 211: Engineering Aspects of Waste Control
CE 212: Engineering Climatology
CE 216: Hydrology
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineeering II
CE 219: Groundwater and Seepage
CE 276: Water Resources Planning and Control
E Ad 221–22: Environmental Management
ES 270: Introduction to Acoustics
ES 274: Noise and Vibration Control
ME 221: Intermediate Fluid Mechanics
ME 224: Fundamentals of Combustion Engines
ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 260: Heating, Refrigeration, and Air Conditioning
ME 261: Fundamentals of Environmental Control I
ME 262: Fundamentals of Environmental Control II
ME 263: Environmental Control Processes I
ME 264: Environmental Control Processes II
ME 265: Air-pollution Meteorology
ME 266: Air-pollutants Sampling and Analysis
ME 282: Energy Technology
ME 288: Convective Heat and Mass Transfer
ME 291–92: Power Systems
ME 298: Research
ME 299–300: Thesis Research
ME 398: Advanced Reading and Research
ME 399: Dissertation Research

ergy and Power

Ap S 211: Analytical Methods in Engineering I

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

Ap S 213:	Analytical Methods in Engineering III
Ap S 215:	Special Topics in Engineering Analysis
EE 133:	Electromagnetic Waves
EE 236:	Plasma Dynamics
ME 221:	Intermediate Fluid Mechanics
ME 224:	Fundamentals of Combustion Engines
ME 225:	Turbomachinery I
ME 226:	Turbomachinery II
ME 227:	Viscous Flow
ME 235:	Compressible Flow
ME 237:	Propulsion I
ME 238:	Propulsion II
ME 281:	Nonequilibrium Thermodynamics
ME 282:	Energy Technology
ME 283:	Nuclear Reactor Engineering
ME 287:	Heat Conduction
ME 288:	Convective Heat and Mass Transfer
ME 291–92:	Power Systems
ME 298:	Research
ME 299–300:	Thesis Research
ME 398:	Advanced Reading and Research
ME 399:	Dissertation Research

Flight Sciences*

Ap S 211:	Analytical Methods in Engineering I
Ap S 213:	Analytical Methods in Engineering III
Ap S 215:	Special Topics in Engineering Analysis
ES 284:	Numerical Methods in Engineering
ME 215:	Theory of Vibrations
ME 221:	Intermediate Fluid Mechanics
ME 222:	Applied Fluid Dynamics
ME 223:	Aeroelasticity
ME 227:	Viscous Flow
ME 235:	Compressible Flow
*ME 248:	Seminar: Aircraft Design
*ME 270:	Aerodynamics of Flight Vehicles
*ME 271:	V/STOL Flight Dynamics
*ME 273:	Principles of Automatic Flight Control
*ME 274:	Principles of Flight Guidance
ME 275:	Stability and Control of Vehicles
*ME 279:	Special Topics in Flight Sciences
ME 298:	Research
ME 299–300:	Thesis Research
ME 312:	Theory of Turbulence
ME 315:	Hypersonic Flow
ME 398:	Advanced Reading and Research
ME 399:	Dissertation Research

Fluid Mechanics and Thermal Sciences

Ap S 211:	Analytical Methods in Engineering I
Ap S 212:	Analytical Methods in Engineering II
Ap S 213:	Analytical Methods in Engineering III
Ap S 214:	Analytical Methods in Engineering IV

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

Ap S 215: Special Topics in Engineering Analysis
CE 212: Engineering Climatology
CE 256: Introduction to Ocean and Coastal Engineering
CE 259: Theory of Ship Motions and Sea Loads
CE 268: Applied Marine Hydromechanics
CE 271: Theoretical Marine Hydromechanics
CE 274: Mechanics of Water Waves
CE 275: Special Topics in Ocean Engineering
EE 133: Electromagnetic Waves
EE 236: Plasma Dynamics
ES 228: Physical Oceanography
ME 218: Design of Floating and Submerged Marine Vehicles
ME 221: Intermediate Fluid Mechanics
ME 222: Applied Fluid Dynamics
ME 223: Aeroelasticity
ME 227: Viscous Flow
ME 231: Hydrodynamics
ME 235: Compressible Flow
ME 280: Advanced Thermodynamics
ME 281: Nonequilibrium Thermodynamics
ME 282: Energy Technology
ME 287: Heat Conduction
ME 288: Convective Heat and Mass Transfer
ME 289: Radiative Heat Transfer
ME 291–92: Power Systems
ME 295: Statistical Thermodynamics
ME 297: Special Topics in Fluid Mechanics
ME 298: Research
ME 299–300: Thesis Research
ME 310: Mechanics of Non-Newtonian Fluids
ME 311: Nonsteady Flow
ME 312: Theory of Turbulence
ME 315: Hypersonic Flow
ME 317: Physical Gas Dynamics
ME 398: Advanced Reading and Research
ME 399: Dissertation Research

Geotechnics and Foundation Engineering

Ap S 213: Analytical Methods in Engineering III
CE 204: Applied Soil Mechanics I
CE 205: Applied Soil Mechanics II
CE 206: Foundation Engineering
CE 207: Soil Dynamics
CE 208: Rock and Ice Mechanics
CE 209: Theoretical Soil Mechanics
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineering II
CE 219: Groundwater and Seepage
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 265: Special Topics in Soil Mechanics and Foundation Engineering
CE 298: Research
CE 299–300: Thesis Research
CE 398: Advanced Reading and Research
CE 399: Dissertation Research
ES 221: Theory of Elasticity I

ES 256:	Introduction to the Theories of Inelastic Media
ES 285:	Finite Element Methods in Engineering Mechanics
*Geol 128:	Geomorphology
*Geol 163:	Sedimentation
*Geol 189:	Geophysics of the Solid Earth
*Geol 224:	Advanced Structural Geology

Hydromechanics

Ap S 211:	Analytical Methods in Engineering I
Ap S 212:	Analytical Methods in Engineering II
Ap S 213:	Analytical Methods in Engineering III
Ap S 214:	Analytical Methods in Engineering IV
Ap S 215:	Special Topics in Engineering Analysis
CE 212:	Engineering Climatology
CE 216:	Hydrology
CE 255:	Coastal Processes
CE 256:	Introduction to Ocean and Coastal Engineering
CE 259:	Theory of Ship Motions and Sea Loads
CE 271:	Theoretical Marine Hydromechanics
CE 274:	Mechanics of Water Waves
CE 275:	Special Topics in Ocean Engineering
CE 298:	Research
CE 299–300:	Thesis Research
CE 398:	Advanced Reading and Research
CE 399:	Dissertation Research
EE 236:	Plasma Dynamics
ES 228:	Physical Oceanography
ES 284:	Numerical Methods in Engineering
ME 218:	Design of Floating and Submerged Marine Vehicles
ME 221:	Intermediate Fluid Mechanics
ME 222:	Applied Fluid Dynamics
ME 227:	Viscous Flow
ME 231:	Hydrodynamics
ME 297:	Special Topics in Fluid Mechanics
ME 310:	Mechanics of Non-Newtonian Fluids
ME 311:	Nonsteady Flow

Mechanical Engineering Design

CS 284:	Applications of Numerical Methods
ES 251–52:	Transportation
ES 282:	Computer-aided Design
ES 283:	Application of Computer Graphics in Engineeering
ME 161:	Advanced Dynamics
ME 218:	Design of Floating and Submerged Marine Vehicles
ME 221:	Intermediate Fluid Mechanics
ME 225:	Turbomachinery I
ME 226:	Turbomachinery II
ME 240:	Kinematic Synthesis
ME 241:	Engineering Systems Design
ME 243:	Advanced Mechanical Engineering Design
ME 246:	Electromechanical Control Systems
ME 247:	Fluidics
ME 250:	Energy Systems Design
ME 253:	Vehicular Performance

* For Geology course descriptions, see the *Undergraduate and Graduate Catalogue.*

ME 298: Research
ME 299–300: Thesis Research

Ocean, Marine, and Coastal Engineering

Ap S 211: Analytical Methods in Engineering I
Ap S 213: Analytical Methods in Engineering III
Ap S 215: Special Topics in Engineering Analysis
CE 203: Prestressed Concrete Structures
CE 206: Foundation Engineering
CE 208: Rock and Ice Mechanics
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineering II
CE 219: Groundwater and Seepage
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 255: Coastal Processes
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 259: Theory of Ship Motions and Sea Loads
CE 260: Statistical Theory for Ship Hull Performance Prediction
CE 265: Special Topics in Soil Mechanics and Foundation Engineering
CE 268: Applied Marine Hydromechanics
CE 271: Theoretical Marine Hydromechanics
CE 274: Mechanics of Water Waves
CE 275: Special Topics in Ocean Engineering
CE 298: Research
CE 299–300: Thesis Research
CE 398: Advanced Reading and Research
CE 399: Dissertation Research
ES 209: Technical and Environmental Risk Assessment, Control, and Insurance
ES 228: Physical Oceanography
*Geol 282: Oceanography
ME 218: Design of Floating and Submerged Marine Vehicles
ME 231: Hydrodynamics

Public Works Engineering

CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 206: Foundation Engineering
CE 208: Rock and Ice Mechanics
CE 211: Engineering Aspects of Waste Control
CE 212: Engineering Climatology
CE 215: Urban Construction Technology
CE 216: Hydrology
CE 217: Water Resources Engineering I
CE 218: Water Resources Engineering II
CE 220: Urban Transportation Engineering
CE 221: Pavement and Runway Design
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 255: Coastal Processes
CE 256: Introduction to Ocean and Coastal Engineering

*For Geology course descriptions, see the *Undergraduate and Graduate Catalogue.*

CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 276: Water Resources Planning and Control
E Ad 204: Administration of Engineering Contracts
E Ad 210: Engineering Law
E Ad 241: Construction Management I
E Ad 242: Construction Management II
E Ad 243: Construction Management III
E Ad 261: Economic Analysis in Engineering Planning
ES 209: Technical and Environmental Risk Assessment, Control, and Insurance

Risk Assessment and Assurance Technology

Prerequisite: Ap S 115, Stat 191*. At least five courses must be selected from those listed under the Department of Civil, Mechanical, and Environmental Engineering, at least three from those listed under Operations Research; and at least one from those listed under Economics. Courses marked with the dagger symbol (†) are required of all students. The selection of elective courses depends on the emphasis for specific technological areas.

Civil, Mechanical, and Environmental Engineering

CE 212: Engineering Climatology
CE 223: Traffic Engineering
†CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Engineering
CE 256: Introduction to Ocean and Coastal Engineering
CE 260: Random Processes in Ocean and Coastal Engineering
CE 299–300: Thesis Research
ES 209: Technical and Environmental Risk Assessment, Control, and Insurance
ES 240: Fracture Mechanics
ES 241: Fatigue
ME 253: Vehicular Performance
ME 261: Fundamentals of Environmental Control I

Operations Research

OR 261: Theory of Games
†OR 271: Forecasting Techniques
†OR 281: Reliability Theory I
†OR 361: Games, Decisions, and Value Theory
OR 381: Reliability Theory II

*Economics**

Econ 217–18: Survey of Economics
Econ 275: Econometrics I: Introduction
Econ 315: Seminar: Topics in Mathematical Economics

Solid Mechanics and Materials Engineering

Ap S 211: Analytical Methods in Engineering I
Ap S 212: Analytical Methods in Engineering II
Ap S 213: Analytical Methods in Engineering III
Ap S 214: Analytical Methods in Engineering IV
Ap S 215: Special Topics in Engineering Analysis
CE 207: Soil Dynamics

* For Economics and Statistics course descriptions, see the *Undergraduate and Graduate Catalog*

CE 208: Rock and Ice Mechanics
CE 209: Theoretical Soil Mechanics
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Engineering
CE 261: Analysis of Plates and Shells
ES 221: Theory of Elasticity I
ES 222: Theory of Elasticity II
ES 232: Advanced Materials Science
ES 233: Superconductivity and Electron Transport
ES 234: Composite Materials
ES 235: Physical Metallurgy
ES 240: Fracture Mechanics
ES 241: Fatigue
ES 242: Material Recycling and Recovery
ES 256: Introduction to the Theories of Inelastic Media
ES 284: Numerical Methods in Engineering
ES 285: Finite Element Methods in Engineering Mechanics
ES 298: Research
ES 299–300: Thesis Research
ES 398: Advanced Reading and Research
ES 399: Dissertation Research
ME 215: Theory of Vibrations
ME 216: Structural Dynamics
ME 221: Intermediate Fluid Mechanics
ME 280: Advanced Thermodynamics
ME 281: Nonequilibrium Thermodynamics
ME 310: Mechanics of Non-Newtonian Fluids

Structural Engineering

Ap S 212: Analytical Methods in Engineering II
Ap S 213: Analytical Methods in Engineering III
Ap S 214: Analytical Methods in Engineering IV
CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 206: Foundation Engineering
CE 210: Methods of Structural Analysis
CE 215: Urban Construction Technology
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Engineering
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 261: Analysis of Plates and Shells
CE 262: Design of Plate and Shell Structures
CE 263: Theory of Structural Stability
CE 298: Research
CE 299–300: Thesis Research
CE 398: Advanced Reading and Research
CE 399: Dissertation Research
ES 221: Theory of Elasticity I
ES 234: Composite Materials
ES 240: Fracture Mechanics

ES 241: Fatigue
ES 256: Introduction to the Theories of Inelastic Media
ES 282: Computer-aided Design
ES 283: Application of Computer Graphics in Engineering
ES 284: Numerical Methods in Engineering
ES 285: Finite Element Methods in Engineering Mechanics

Transportation Engineering

OPTION I: TECHNOLOGY OF THE VEHICLE

CE 201: Design of Metal Structures
CE 210: Methods of Structural Analysis
CE 220: Urban Transportation Engineering
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 259: Theory of Ship Motions and Sea Loads
CE 260: Random Processes in Ocean and Coastal Engineering
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability
ES 241: Fatigue
ES 251–52: Transportation
ME 215: Theory of Vibrations
ME 218: Design of Floating and Submerged Marine Vehicles
ME 222: Applied Fluid Dynamics
ME 223: Aeroelasticity
ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 237: Propulsion I
ME 238: Propulsion II
ME 241: Engineering Systems Design
ME 243: Advanced Mechanical Engineering Design
ME 246: Electromechanical Control Systems
ME 250: Energy Systems Design
ME 253: Vehicular Performance
ME 255–56: Urban Transportation Technology
ME 275: Stability and Control of Vehicles
ME 286: Special Topics in Mechanical Engineering
ME 298: Research
ME 299–300: Thesis Research
ME 398: Advanced Reading and Research
ME 399: Dissertation Research
*U&RP 208: Urban Transportation Planning
*U&RP 209: Urban Transportation Models

OPTION II: THE WAY (ROUTE STRUCTURES AND FACILITIES)

CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 204: Applied Soil Mechanics I
CE 205: Applied Soil Mechanics II
CE 206: Foundation Engineering
CE 207: Soil Dynamics

* For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Catalogue.*

CE 209: Theoretical Soil Mechanics
CE 210: Methods of Structural Analysis
CE 219: Groundwater and Seepage
CE 220: Urban Transportation Engineering
CE 221: Pavement and Runway Design
CE 222: Stations and Terminals
CE 223: Traffic Engineering
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 255: Coastal Processes
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
ES 240: Fracture Mechanics
ES 241: Fatigue
ES 251–52: Transportation
ES 298: Research
ES 299–300: Thesis Research
ES 398: Advanced Reading and Research
ES 399: Dissertation Research
ME 255–56: Urban Transportation Technology
OR 231: Theory of Traffic Flow
*U&RP 208: Urban Transportation Planning
*U&RP 209: Urban Transportation Models

OPTION III: TRANSPORTATION SYSTEMS†

CE 220: Urban Transportation Engineering
CE 223: Traffic Engineering
E Ad 281–82: Systems Analysis and Management
ES 209: Technical and Environmental Risk Assessment, Control, and Insurance
ES 251–52: Transportation
‡Law 349: Local Government Law
‡Law 372: Administrative Law
‡Law 407: Seminar: Regulation of Transportation I
‡Law 408: Seminar: Regulation of Transportation II
‡Law 492: Seminar: Science and the Legal Process
‡Law 501: Land Development Law
‡Law 505: Intergovernmental Relations I
‡Law 506: Intergovernmental Relations II
ME 255–56: Urban Transportation Technology
ME 298: Research
ME 299–300: Thesis Research
ME 398: Advanced Reading and Research
ME 399: Dissertation Research
OR 201: Survey of Operations Research Methods I
OR 231: Theory of Traffic Flow
OR 251: Linear Programming
OR 252: Nonlinear and Dynamic Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation

* For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Catalogue*.
† Prerequisite courses for admission to this option are Ap S 115 and Stat 191 (See the *Undergraduate and Graduate Catalogue*).
‡ For Law course descriptions, see the *National Law Center* catalogue.

OR 277:	Queuing Theory
*U&RP 201:	Introduction to Urban Planning
*U&RP 206:	Community Facilities Planning
*U&RP 208:	Urban Transportation Planning
*U&RP 209:	Urban Transportation Models

Urban Environmental Engineering

CE 201:	Design of Metal Structures
CE 202:	Design of Reinforced Concrete Structures
CE 203:	Prestressed Concrete Structures
CE 204:	Applied Soil Mechanics I
CE 206:	Foundation Engineering
CE 211:	Engineering Aspects of Waste Control
CE 212:	Engineering Climatology
CE 215:	Urban Construction Technology
CE 216:	Hydrology
CE 217:	Water Resources Engineering I
CE 218:	Water Resources Engineering II
CE 219:	Groundwater and Seepage
CE 220:	Urban Transportation Engineering
CE 223:	Traffic Engineering
CE 272:	Advanced Waste Treatment Process Design
CE 273:	Membrane Processes for Water Treatment
CE 276:	Water Resources Planning and Control
E Ad 204:	Administration of Engineering Contracts
E Ad 207:	The Personnel Function for Engineering Administrators
E Ad 210:	Engineering Law
E Ad 261:	Economic Analysis in Engineering Planning
ES 209:	Technical and Environmental Risk Assessment, Control, and Insurance
ES 251–52:	Transportation
ME 255–56:	Urban Transportation Technology
ME 261:	Fundamentals of Environmental Control I
ME 262:	Fundamentals of Environmental Control II
ME 263:	Environmental Control Processes I
*U&RP 204:	Urban Development Planning
*U&RP 205:	Urban Housing
*U&RP 207:	Land Development Planning
*U&RP 208:	Urban Transportation Planning

CIVIL ENGINEERING COURSES

201 Design of Metal Structures (3)

Structural behavior and failure of metal structures; conception and design of structural systems for various cases, including low- and high-rise buildings, long-span structures, bridges, suspended roofs, and special structures. Prerequisite: CE 191 or equivalent. (Spring)

202 Design of Reinforced Concrete Structures (3)

Modes of failure of reinforced concrete structures; selection of appropriate structural system; design of slabs, frames, folded plate roofs, shell structures, and other special structures. Prerequisite: CE 192 or equivalent. (Fall)

* For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Catalogue*.

203 Prestressed Concrete Structures (3)

Structural behavior and failure modes of prestressed concrete structures; design in prestressed concrete, including long-span structures, bridges, and precast systems. Prerequisite: CE 202 or equivalent. (Spring)

204 Applied Soil Mechanics I (3)

Theories of soil strength; bearing capacity of shallow foundations and their design; deep foundations, including pile types and design criteria; theories of lateral earth pressure with applications; stability analyses of slopes. Selected experiments in the soil mechanics laboratory. Prerequisite: CE 168 or equivalent. (Spring)

205 Applied Soil Mechanics II (3)

Nature of soil, including geological and pedological aspects; flow of water in soil; seepage involving foundations, dams, and wells; stress distribution in earth masses; one- and three-dimensional theories of consolidation; analysis of settlement. Selected experiments in the soil mechanics laboratory. Prerequisite: approval of Department. (Fall)

206 Foundation Engineering (3)

Principles of soil mechanics and structural mechanics applied to the analysis and design of spread footings and mat foundations, pile foundations, retaining structures, including sheeting and bracing systems, and waterfront structures. Problems associated with subsurface exploration, dewatering excavations, and underpinning. Prerequisite: CE 182, 204; or equivalent. (Spring)

207 Soil Dynamics (3)

(Formerly Special Topics in Soil Mechanics)

Stress-strain behavior of soil under transient and repeated loads, effects of earthquakes upon foundations and earth dams, design of machinery foundations. Prerequisite: CE 168 or equivalent. (Spring)

208 Rock and Ice Mechanics (3)

Classification, composition, and structure of rocks; elastic and rheological properties; fracture; effect of hydrostatic pressure and temperature; effect of water; strain measurement and testing. Composition and structure of ice; deformation, flow and fracture. Engineering, geophysical, and geological applications. Prerequisite: ES 256 or equivalent. (Fall)

209 Theoretical Soil Mechanics (3)

Advanced theories of consolidation. Yield condition in soils. Application of theories of plasticity in soil mechanics. Elements of wave propagation in soils, including surface waves. Prerequisite: CE 204, ES 221; or equivalent. (Fall)

210 Methods of Structural Analysis (3)

Classical and modern methods of analysis of statically indeterminate structures, including matrix analysis, variational methods, finite elements, theory of plastic collapse and shakedown. Prerequisite: graduate status. (Fall)

211 Engineering Aspects of Waste Control (3)

Characteristics of waste, some important pollution indicators, fundamentals of biochemical engineering for waste control, physical unit opera-

tions, chemical and biological unit processes, design of treatment facilities. Prerequisite: CE 197 or equivalent. (Fall)

212 **Engineering Climatology** (3)

Constitution of atmosphere, stability conditions, energy-balance characteristics, atmospheric motions, storm-forecasting models, evaporation, precipitation and fog formation. Air pollution problems. Prerequisite: approval of Department. (Fall)

215 **Urban Construction Technology** (3)

Modern designs and construction techniques for the city, modular construction, construction management and planning. Prerequisite: approval of Department. (Spring)

216 **Hydrology** (3)

Precipitation, evaporation, and transpiration. Soil physics; stream flow, drainage basins, hydrograph analysis, and stream-flow routing. Design criteria, flood frequency statistics and analysis, flood forecasting and control, water supply forecasting. Prerequisite: CE 193 or approval of Department. (Spring)

217 **Water Resources Engineering I** (3)

Hydrology; open-channel flow with application to navigation, irrigation, water power; water supply and distribution. Prerequisite: Ap S 114, CE 193; or equivalent. (Fall)

218 **Water Resources Engineering II** (3)

Groundwater; pollution and sanitation in sewers, lakes, estuaries; water-resources planning; special problems. Prerequisite: CE 217 or equivalent. (Spring)

219 **Groundwater and Seepage** (3)

Permeability theory or groundwater flow, flownets, analogs, computer solutions; applications to engineering problems such as excavation dewatering, flow through dams, stabilization of earth slopes. Prerequisite: Ap S 211 and concurrent registration in Ap S 213. (Fall)

220 **Urban Transportation Engineering** (3)

Introduction to urban transportation planning. Analysis of urban transportation requirements. Evaluation procedure for the selection between alternative solutions. Prerequisite: approval of Department. (Fall)

221 **Pavement and Runway Design** (3)

Pavement types, wheel-load characteristics; stresses in pavements and subgrades based on elastic and viscoelastic theories; empirical methods of design of flexible and rigid highway and airfield pavements; general principles of runway design. Prerequisite: CE 202, 204; ES 221. (Spring)

222 **Stations and Terminals** (3)

Unified treatment of the functions and operation of stations and terminals of transportation systems; emphasis on specifications and planning criteria. Problems of locating the facility, passenger and freight handling, intra-modal and inter-modal interfacing, communication and control. Illustrations include railroad and subway stations, bus terminals, airports, and harbors. Prerequisite: approval of Department. (Spring)

223 **Traffic Engineering** (3)

Problems associated with traffic flow improvement in networks. Traffic management in automated networks. Implications of headway and capacity on control system implementation. Study and comparison of control system designs for specific applications (highway flow metering, dual modes, personal rapid transit, etc.). Prerequisite: Ap S 115 or equivalent and approval of Department. (Fall)

252 **General Structural Dynamics** (3)

Analysis of elastic structures under dynamic loadings—steady-state, transient, and stochastic; vibrations of rigid frames, plates, and thin shells. Stochastic load processes—wind, earthquake, sea; failure under stochastic loading—first exceedance, damage accumulation. Prerequisite: Ap S 115, CE 210; or equivalent and approval of Department. (Spring)

253 **Failure and Reliability Analysis of Engineering Structures** (3)

Operational and structural failure mechanisms; instability, fracture, and fatigue. Operational and structural safety, probability of failure. Aspects of probabilistic structural analysis, statistics of extremes, risk and reliability, optimal design criteria. Prerequisite: Ap S 115 or equivalent. (Fall)

254 **Special Topics in Structural Engineering** (3)
(Formerly Special Topics in Structural Mechanics)

Selected problems in structural mechanics and design: (1) thermal stresses in structural systems, (2) advanced probabilistic structural mechanics, (3) structural design for dynamic loads, (4) structural design for repeated loads, or (5) structural synthesis and optimization. May be repeated for credit. Prerequisite: CE 201 or 202, and CE 210, and approval of Department. Topic to be announced in the *Schedule of Classes*. (Fall and spring)

255 **Coastal Processes** (3)

Longshore currents and nearshore circulation; coastal sediment properties and analysis, longshore transport processes and rates; sediment budget; response of beaches to wave action and structures; tidal inlets, mechanical bypassing; beach nourishment; wind transport of sandy dune stabilization, sediment tracing. Prerequisite: approval of Department. (Spring)

256 **Introduction to Ocean and Coastal Engineering** (3)

Application of wave mechanics to the analysis of wave motion in coastal and offshore regions: reflection, diffraction, refraction. Wave spectra: procurement of spectral data by direct measurement or from hind-casting techniques. Beaches and littoral drift, mixing processes, outfalls and intakes in the oceans and estuaries, wave forces on coastal and offshore structures, harbor oscillations, tides in estuaries. Prerequisite: Ap S 115, ME 221; or equivalent. (Spring)

257 **Harbor and Coastal Engineering I** (3)

Waves and swells, tides and currents, coastal regime, estuaries and deltas, structures for coastal protection, principles of harbor navigation, harbor planning and harbor design, breakwaters and sea walls, quays, docks, internal access structures; maintenance of external and internal access, dredging. Prerequisite: CE 256. (Fall)

258 **Harbor and Coastal Engineering II** (3)

Interaction between structures and waves. Analysis and design of flexible structures: piers, jetties, and protective structures; off-shore drilling plat-

forms. Design criteria, moorings and cables, harbor operations equ
ment. Prerequisite: CE 257; CE 252 or equivalent. (Spring)

259 **Theory of Ship Motions and Sea Loads** (3)

Hydrodynamics of bodies oscillating in calm water. Cylinders in the fr
surface. Forces and moments on a fixed body in waves. Linear-stru
theory for six degrees of freedom motions for ships and ocean structure
in regular waves. Nonlinear-roll motions. Dynamic loads on floati
vehicles and fixed structures in a seaway. Prerequisite: CE 268, 271;
equivalent. (Fall)

260 **Random Processes in Ocean and Coastal Engineering** (3)
(Formerly Statistical Theory for Ship Hull Performance Prediction)

Basic principles and concepts of spectral analysis, related topics necessar
for statistical prediction of ocean waves, response of floating and coast
structures. Distribution of envelope of narrow band random processes
long-term prediction, extreme values. Prerequisite: Ap S 115 or equiva
lent. (Fall)

261 **Analysis of Plates and Shells** (3)

Bending and stretching of thin elastic plates under loading with variou
boundary conditions, continuous plates and plates on elastic foundations
theory of folded plate structures. Theory of curved surfaces; genera
linear bending theory and its simplification to membrane theory; bend
ing stresses in shells of revolution, shallow shell theory. Specific appl
cations. Prerequisite: graduate status. (Fall)

262 **Design of Plate and Shell Structures** (3)

Design of long-span plate and shell roof structures in reinforced concrete
and metal; design of containers for fluids and granular materials; com
puter applications in the analysis of such structures. Prerequisite: CE
201, 202, 261; or equivalent. (Spring)

263 **Theory of Structural Stability** (3)

General criteria for stability; buckling of elastic and inelastic columns and
frames; torsional and lateral buckling; variational methods. Buckling of
plates and shells under static loads; stability of stiffened structures; effe
of imperfections and boundary conditions. Prerequisite: graduate status
(Spring)

265 **Special Topics in Soil Mechanics and Foundation Engineering** (3)

Selected topics such as rheology of soils, computer applications, excava
tion and tunneling, ocean engineering problems, or other special topics
May be repeated for credit. Prerequisite: approval of Department.
(Spring)

268 **Applied Marine Hydromechanics** (3)

Introductory course; emphasis on experimental methods dealing with fl
application of hydrodynamics to problems relating to the design and per
formance of ships in the following areas: ship hydrostatics (terminology
and concepts), ship resistance (viscous, form, and wave drag), propul
sion (screws and other propulsors), dynamics of floating vehicles (maneu
vering and control, ship motion in a seaway). Special attention in each
area to solving problems related to unusual, as well as conventional, ma
rine vehicles. Prerequisite: approval of Department. (Fall)

271 **Theoretical Marine Hydromechanics** (3)

Introductory course designed to acquaint the student with some physical concepts and mathematical tools of theoretical marine hydromechanics. Derivation of the fundamental equations and application of potential flow theory to fluid motion around two- and three-dimensional bodies. Introduction to thin-ship and slender-body theories. Derivation of force and moment of bodies moving in calm and disturbed water. Prerequisite: approval of Department. (Fall)

272 **Advanced Waste Treatment Process Design** (3)

Pre-design considerations; application of kinetics to treatment processes; reactor types and flow characteristics; theory of continuous culture; general considerations of activated sludge processes for industrial waste treatment; miscellaneous topics. Prerequisite: CE 211 or equivalent.

273 **Membrane Processes for Water Treatment** (3)

Survey of different membrane separation processes, including reverse osmosis, electrodialysis, ultrafiltration, dialysis, and others. Process fundamentals and equipment requirements. Application to problems of desalting, waste water reclamation and recycling, depollution of industrial waste waters, and water reuse. Prerequisite: CE 217 or equivalent. (Spring)

274 **Mechanics of Water Waves** (3)

Irrotational theory for deep- and shallow-water waves, reflexion, refraction, diffraction, attentuation. Water waves of finite amplitude: shallow-water theory, tides, bores, long-waves theory, conoidal and solitary waves. Wave generation by wind, state-of-the-art based on correlation between theory and measurements. Wave-breaking and reflexion. Prerequisite: ME 221 or equivalent and permission of instructor. (Fall)

275 **Special Topics in Ocean Engineering** (3)

Selected topics: (1) marine aspects of viscous-flow theory, (2) interfacial (internal) waves, (3) applied random processes in ocean and coastal engineering, or (4) other selected topics. May be repeated for credit. Prerequisite: approval of Department. (Spring)

276 **Water Resources Planning and Control** (3)

The parameters of water resources planning and control; economics of water resources and related natural resources; economics of water quality control; physical parameters of water resource development; water resources law. Prerequisite: approval of Department. (Spring)

281 **Special Topics in Geotechnical Engineering** (3)

29[illegible] **Research** (arr.)

Basic research projects, as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

MECHANICAL ENGINEERING COURSES

201 Mechanical Measurement (3)

Precise measurements of mass and length, mechanical and interferomet methods. Prerequisite: approval of Department. (Fall—evening)

202 Heat Measurement (3)

Temperature scales; measurement by resistance thermometry, thermo couples, pyrometry, vapor pressure thermometry; heat transfer quantities and their measurement; calorimeters, flow calorimeters. Prerequisite: proval of Department. (Fall—evening)

203 Pressure Measurement (3)

Experimental techniques for quantitative measurement of pressure: work ing gages, standards, calibration procedures; methods and apparatus observations near atmospheric pressure, in the high pressure range and the vacuum range. Prerequisite: approval of Department. (Spring evening)

215 Theory of Vibrations (3)

Damped and undamped natural vibrations, transient response and respons to harmonic and periodic excitation, natural vibration of discrete continuous systems; integral formulation of eigenvalue problems, respons by modal analysis, approximate methods, influence of secondary effect and constraints, damped systems. Prerequisite: approval of Departme (Fall)

216 Structural Dynamics (3)

Methods of solving vibration problems: differential equation, Rayleigh Ritz finite element. Free and forced vibration of structural components straight, curved, and thin-walled beams; plates and shells; sandwich co struction. Vibration of built-up structures. Structural wave motion, wa motion in periodic structures. Prerequisite: ME 215. (As arranged)

218 Design of Floating and Submerged Marine Vehicles (3)

Consideration of interaction between hydrodynamics, propulsion, and co figuration aspects of design of floating structures and vehicles; effects o submergence and deep submergence; hydrofoil and vertical jet actua structural considerations. Prerequisite: ES 228. (Fall)

221 Intermediate Fluid Mechanics (3)

The continuum, kinematics of fluids; stress tensor, strain and rate-of-strain tensor; fundamental equations of the flow of viscous compressible fluids Laplace's equations; source, sink, and doublet; vortices. Biot-Savart the rem and the flow field of a vortex; spherical and cylindrical harmonics methods of singularity distributions, complex-variable methods; lamin flow of viscous incompressible fluids; boundary-layer concept. Prereq site: approval of Department. (Fall)

222 Applied Fluid Dynamics (3)

Subsonic lifting line wing theory, direct and inverse solution of the lifting surface theory; singularity method for wing-body combination; vortex lift theory; effects of camber and twist distribution; transonic airfoil effect of wing sweep, area ruling concept; supersonic linearized wing the ory; similarity rules. Prerequisite: ME 221 or equivalent. (Spring)

223 **Aeroelasticity** (3)

Introduction to aeroelastic phenomena; structural deformations of vehicles under static and dynamic loads; vibrations of vehicle structures; static aeroelastic problems (structural deformation, divergence, control effectiveness, and reversal); flutter theory and calculation of flutter boundaries; aerodynamics of steady and nonsteady two-dimensional wings in subsonic, sonic, and supersonic flow; strip theory applications of two-dimensional aerodynamics to three-dimensional lifting surfaces; piston theory and Newtonian-flow theory. Prerequisite: ME 215, 221; or equivalent. (Fall)

224 **Fundamentals of Combustion Engines** (3)

Classification of combustion engines: air cycles, vapor cycles, external combustion engines, internal combustion engines; rotary engines, reciprocating engines, and turbomachinery; ideal cycle analysis; engine heat losses and friction; practical cycle analysis status of computerized cycle analysis; combustion and knocking; carburetion and fuel injection; mixture distribution; valve mechanism; ignition systems; combustion chamber; piston-engine, rotary-engine, and turbomachinery mechanics and balance. Prerequisite: approval of Department. (Fall)

225 **Turbomachinery I** (3)

Review of thermodynamic principles; fundamentals of fluid flow; hydraulic power systems; steam and gas turbine cycles; turbine, compressor, and pump types; energy interchange in fluid machinery; design and characteristics of turbines, compressors, and pumps; linking of compressor and compressor turbine characteristics; combustion systems; regenerators. Prerequisite: approval of Department. (Fall)

226 **Turbomachinery II** (3)

Aerodynamics of aerofoils, flow in cascades, data for turbine calculations, axial turbine aerodynamic design, performance of compressor cascades, axial compressor aerodynamic design. Heat and mass transfer with chemical reaction, combustion of liquid fuels, combustion in premixed gases, combustion without premixing, gas-turbine combustion chamber design. Prerequisite: ME 225. (Spring)

227 **Viscous Flow** (3)

Exact solutions of Navier-Stokes equations; the small Reynolds number approximations, laminar boundary-layer theory and the techniques for its solution, stability of laminar flows; Reynolds theory of turbulent stresses, applications to internal and external flows, turbulent boundary-layer theory; applications to heat transfer problems; flow separation. Prerequisite: Ap S 213; ME 221 or equivalent. (Fall)

231 **Hydrodynamics** (3)

Flow at large Reynolds number: vorticity dynamics, Kelvin's theorem in inviscid flow, vorticity in motions generated from rest, boundary layers, applications of the momentum theorem. Irrotational flow theory: applications of Bernoulli and momentum theorems to steady flows, flow due to a rigid body, two-dimensional motion and applications of complex variable theory, free surface flows, Froude numbers, criterion of dynamic similarity. Effectively inviscid flow with vorticity: sheet vortex, flow with swirl, vortex system of a wing. Prerequisite: ME 221 or equivalent. (Spring)

235 **Compressible Flow** (3)

Thermodynamics and physical properties of gases, fundamental equations

of a compressible inviscid fluid, small perturbation theory, expansions Mach number and thickness parameters, second-order shock shapes, of entropy in supersonic flow, shock wave interactions, hodograph tra formation, Kármán-Tsien and other model gases, conical flows, transo flow theory, method of characteristics, rotational nonisentropic flows. Pr requisite: Ap S 213; ME 221 or equivalent. (Spring)

237 **Propulsion I** (3)

Basic concepts of propulsion: energy transformations in propulsive flow gas dynamics of combustion, detonation processes; nonuniform flow mixing; intakes, additive drag; mechanics of flow induction; drag an thrust generation; multiple-flow thrust generators; thrust recovery and aug mentation; the propulsion spectrum. Illustrative examples will includ propellers, turbojets, turbofans, ramjets, and rockets. Prerequisite: ap proval of Department. (Spring)

238 **Propulsion II** (3)

Advanced propulsion concepts: nonsteady flows with viscosity, heat t changes, and entropy gradients; discontinuities and interactions in non steady flow; gas dynamics of nonsteady combustion; static, dynamic, and cryptosteady pressure exchange; energy equalizers and dividers; nonsteady flow thrust generators. Topics for discussion will include a variety of no flow induction and propulsion concepts. Prerequisite: ME 237. (Fall)

240 **Kinematic Synthesis** (3)

Determination of linkage proportions from prescribed input-output condi tions for both path and function-generating mechanisms; critical compari son of graphical, analytical, and computer-oriented methods. Techniques are applied to the synthesis of various machines and computers. Pre requisite: approval of Department. (Spring)

241 **Engineering Systems Design** (3)

Principles of system design; interdisciplinary system simulation for fin chancial, electrical, fluid, and thermal sciences; dynamic response of sys tems; mathematical model and analogy studies; optimization techniques with computer-aided solutions. Prerequisite: approval of Department. (Fall)

243 **Advanced Mechanical Engineering Design** (3)

Design of mechanical engineering systems, components, and equipment requires the integration of engineering disciplines at an advanced level. Prerequisite: approval of Department. (Fall)

246 **Electromechanical Control Systems** (3)

System synthesis, compensation, and stabilization using Bode diagrams root locus, etc.; linear and nonlinear characterization of mechanical electromechanical, and electronic control components. Prerequisite: ap proval of Department. (Fall)

247 **Fluidics** (3)

Introduction of fluidic components and systems: behavior and modeling of bistable and proportional jet devices, vortex amplifiers and sensors passive elements, transmission lines; system synthesis, coupling effects Survey of current applications and research. Prerequisite: approval o Department. (Spring)

*248 **Seminar: Aircraft Design** (3)

Problem of designing an aircraft to certain specifications. Regulatory restraints and requirements, state-of-the-art limitations, computer-aided design, integration of aircraft components, economic considerations, and iterations to final configuration to obtain specified mission profile. Prerequisite: approval of Department.

250 **Energy Systems Design** (3)

Discussion of frontier problems such as salt water conversion, transportation devices and systems, systems for space and underwater exploration. Determination of specifications for these systems to meet given needs. Critical discussion of possible solutions based on technical as well as economic and social considerations. Prerequisite: approval of Department. (Spring)

253 **Vehicular Performance** (3)

Methods of performance analysis and evaluation; optimization of schedules and trajectories. Applications to water, land, air, and space vehicles. Prerequisite: approval of Department. (Fall)

255–56 **Urban Transportation Technology** (3–3)

Problems of headway and capacity for modern transit systems and their relationships to control systems, braking, station design, and system management. Urban vehicle design, including propulsion systems, suspension, steering, and switching. System evaluation techniques for technical performance and economic evaluation of new concepts. Prerequisite: approval of Department. (Academic year)

260 **Heating, Refrigeration, and Air Conditioning** (3)

Fluid flow and heat transfer; heating and cooling load calculations; design of heating and cooling distribution systems; design and characteristics of evaporator, condenser, expander, and compressor. Methods of refrigeration and air condition: vapor-compression refrigeration, absorption refrigeration, steam jet refrigeration, thermo-electric refrigeration, low-temperature refrigeration, heat pumps, basic air-standard cycles, regenerative and bootstrap air cycles. Method of heating: warm-air, hot-water, electric-resistance, and solar heating systems and heat pumps. Prerequisite: approval of Department. (Fall)

261 **Fundamentals of Environmental Control I** (3)

Understanding environmental systems, water as natural resources, air as an ecological limiting factor, man's inadvertent modification of weather and climate, solid wastes, noise, pesticides, and radiation, natural resources, utilization of terrestrial ecosystems, international cooperation, citizen participation, environmental needs. Prerequisite: approval of Department. (Fall)

262 **Fundamentals of Environmental Control II** (3)

Directed field investigations; case studies and workshops to document ecological problems associated with power plants, power plant site selection, impoundments, and industrial discharges among others as they relate to the current National Environmental Policy Act of 1970 and the anticipated future national policies. Prerequisite: ME 261 or equivalent. (Spring)

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

263 Environmental Control Processes I (3)

Control of particulates emissions: settling, filtration, cyclonic collection, wet collection, and electrostatic precipitation. Control of gaseous emissions: absorption, adsorption, incineration, and condensation. Design, operation, and current status of air-pollution control processes. Prerequisite: approval of Department. (Spring)

264 Environmental Control Processes II (3)

Selected problems in the application of mechanical engineering science to the design of environmental control equipment, i.e., theory of vortex flow, design of vortex equipment for separation of solid and oil suspensions from water; mechanics of air bubbles in water, mechanical generation of air bubbles, design of turbine, jet diffuser, and porus diffuser for aeration systems; thermodynamics and kinetics of combustion, application of combustion theory to design of incineration systems for sludge and solid disposal; theory of mass transfer and its application to hyperfiltration systems. Prerequisite: ME 261, 262; or equivalent. (Fall)

265 Air-pollution Meteorology (3)

Weather and motion systems of atmosphere; ground- and upper-level air conditions; atmospheric stability and inversions; atmospheric turbulence and diffusion; urban and topographic effects upon meteorological parameters; effects of meteorological parameters upon transportation and diffusion of pollutants; meteorological factors in plant location, design, operation, and in urban planning. Prerequisite: ME 221 or equivalent. (Fall)

266 Air-pollutants Sampling and Analysis (3)

Air and its contaminants, sampling for particulates, sampling for gaseous pollutants, separation of metals and oxides, analysis for organic pollutants, analysis for inorganic pollutants, reference analytical methods, automatic and continuous monitoring. Prerequisite: approval of Department. (Spring)

***270 Aerodynamics of Flight Vehicles (3)**

Aerodynamic loads on flight vehicles, interference effects, application of aerodynamic theory to aircraft design, studies of aircraft dynamics and performance. Prerequisite: ME 222 or equivalent. (Spring)

***271 V/STOL Flight Dynamics (3)**

(Formerly Flight Dynamics of V/STOL Aircraft)

Various configurations of V/STOL aircraft; airscrew theory, performance of V/STOL aircraft. Static and dynamic longitudinal and lateral stability, influence of aerodynamic parameters on flight characteristics, transfer functions of V/STOL aircraft, effect of feedback on stability. Prerequisite: ME 222, 275. (Fall)

***273 Principles of Automatic Flight Control (3)**

Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of Department. (Fall)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

*274 **Principles of Flight Guidance** (3)

Guidance requirements for atmospheric flight; implementation of guidance systems using inertial and radio techniques in conjunction with automatic data processing. Prerequisite: ME 273. (Fall)

275 **Stability and Control of Vehicles** (3)

Derivation of equations of motion, Euler transformations and direction cosines, stability derivatives and linearization of equations of motion, stability of linear systems with application to longitudinal and lateral dynamics, Laplace transform techniques and frequency response analysis. Prerequisite: approval of Department. (As arranged)

*276 **Mechanics of Space Flight** (3)

First- and second-order Hamiltonian-Jacobi perturbation theory applied to artificial satellites, von Zeipel's methods, special and general perturbation theories for third-body perturbations. Differential correction of orbits by weighted least squares and minimum variance techniques. Comparison of various filtering techniques as applied to orbit determination and other space flight parameter estimation. Prerequisite: approval of Department. (As arranged)

*277 **Numerical Methods in Fluid Mechanics** (3)

Numerical solution of partial differential equations of fluid flow; finite-difference techniques for viscous and inviscid flows; stability; methods of characteristics; boundary conditions; applications in subsonic and supersonic flows. Prerequisite: Ap S 213, ES 284; or equivalent.

278 **Performance, Stability, and Control of Helicopters** (3)

Development of rotor blade theories: actuator disc, blade element, vortex theory. Hovering and climb performance, autorotation and forward flight performance. Rotor system mechanics, flapping motion of articulated and semi-rigid rotors, blade motions in plane of rotation. General performance and design considerations. Stability and control in hovering and forward flight, damping in pitch and roll, static stability with speed and angle of attack. Prerequisite: ME 222, 275. (Spring)

*279 **Special Topics in Flight Sciences** (3)

Current problems and methods in high angle of attack stability and control. Nonlinear aerodynamics in the angle of attack region above the stall. Influence of aircraft design and nonlinear aerodynamics parameters on the poststall stability and control of aircraft. Employment of current experimental techniques and development of equations pertaining to developed spin and recovery characteristics. Prerequisite: ME 275 or approval of Department. (Spring)

280 **Advanced Thermodynamics** (3)

Statistical significance of the entropy concept, conditions of equilibrium, equilibrium of heterogeneous systems. Application of thermodynamic formalism to magnetic, electric, and solid systems; equilibrium of ionized gases; the Nernst postulate and the third law of thermodynamics. Prerequisite: graduate status. (Fall)

281 **Nonequilibrium Thermodynamics** (3)

Limitations of equilibrium thermodynamics, entropy production, phenomenological equations and linear laws; postulates of nonequilibrium ther-

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

modynamics, formulation of the equations of nonequilibrium sys statistical foundations, stationary nonequilibrium states; selected ap tions. Prerequisite: ME 280. (Spring)

282 **Energy Technology** (3)

Energy, society, and the national economy; energy consumption pat future outlook for energy supply and demand, projections; world en resources; assumptions for resource estimation and the energy dem conventional fuel resources: nuclear fuels; future resource develop issue of energy production and the environment; prospects for fo shortages; systems approaches to energy conservation. Energy conve fundamental principles and technological options; new technology energy sources. Generation of electricity; trends in the electricity in try; projected growth in the use of electric power; outlook for ele power costs; structure of the electric power industry; planning and c struction of new facilities; environmental effects of generating electric economic implications; regulatory agencies. Prerequisite: approva Department. (Spring)

283 **Nuclear Reactor Engineering** (3)

Atomic and nuclear structures; neutron, fission, and chain reaction; clear reaction and radiation; diffusion and slowing down of neutron icality condition; reactor theory; reflected reactors; homogeneous rea systems; heterogeneous reactor systems; fast reactors; control and op tion of reactors; reactor design calculations; reactor coolants, flow heat transfer; radiation protection and reactor shielding; mechanical structural components of power reactors. Prerequisite: approval of partment. (Spring)

286 **Special Topics in Mechanical Engineering** (3)

Prerequisite: approval of Department. (As arranged)

287 **Heat Conduction** (3)

Conduction of heat through solid, liquid, and gaseous media; formulati and methods of analytical, numerical, and analog solutions; steady one- and three-dimensional problems, problems in unsteady heat conduction conduction in composite regions. Prerequisite: Ap S 213 or equivalent (Fall)

288 **Convective Heat and Mass Transfer** (3)

Heat and momentum transfer in laminar and turbulent flow; applicati of boundary-layer theory to problems of forced convection; the lamin boundary-layer and similarity solutions; heat convection in turbulent momentum-heat transfer analogy; the influence of temperature-depende fluid properties; convective heat transfer at high velocities; mass transf formulation of a simplified theory; some solutions to the conserved pro erty equation. Prerequisite: ME 221 or equivalent. (Spring)

289 **Radintive Heat Transfer** (3)

Nature of thermal radiation; radiative characteristics of surfaces; therm radiation within evacuated enclosures; configuration factors algebra; s tion methods for the integral equations of radiant interchange; enclosu containing an absorbing and emitting medium; absorbing, emitting, a scattering media; combined radiation, conduction, and convection. requisite: Ap S 214 or equivalent. (Fall)

*290 **Kinetic Theory of Gases** (3)

Equation of state and physical properties for gas composed of discrete particles; relation of kinetic theory to thermodynamics; Maxwell distribution of molecular velocities; Boltzmann H theorem. Molecular interactions, free paths, collision rates, scattering coefficients. Introduction to diffusion, viscosity, heat conduction; imperfect gases; flow of gases at low density. Prerequisite: ME 280. (Spring)

291–92 **Power Systems** (3–3)

Design of thermal power system components and system optimization. Steam cycle power generation system components: steam generators, reactor coolant system, condensate and feedwater system, turbine-generator, waste heat removal. Heat balance studies, options for improved cycle efficiencies, system optimization studies, component selection and design, cooling towers, lakes and ponds. Review of safety and pollution regulations; testing, inspection, and codes. Survey of electric power system technology. Prerequisite: ME 148, 187; or equivalent. (Academic year)

295 **Statistical Thermodynamics** (3)

Distribution functions; Boltzmann, Bose-Einstein, and Fermi-Dirac statistics; partition functions, correspondence between classical and statistical thermodynamics. Systems with negligible effects of interparticle forces; perfect gases, perfect electron gas, photon gas. The Debye solid, the Einstein solid. Prerequisite: ME 280. (Spring)

296 **Special Topics in Heat and Mass Transfer** (3)

Prerequisite: approval of Department. (As arranged)

297 **Special Topics in Fluid Mechanics** (3)

Prerequisite: approval of Department. (As arranged)

298 **Research** (arr.)

Research as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

310 **Mechanics of Non-Newtonian Fluids** (3)

Classification of fluids; physical properties of composite fluids; convected coordinate systems; fundamentals of constitutive equations of composite fluids; purely viscous fluids, Reiner and Rivlin theories, power-law fluids; linear theory of viscoelastic fluids, Boltzmann principle, quasi-linear viscol elasticity; nonlinear theory of viscoelasticity, Rivlin-Ericksen theory; viscoplastic fluids, Bingham plastic fluids, Oldroyd's analysis; viscometry and rheogoneometry; turbulent flow of suspensions and emulsions in pipes; frictional drag reduction by polymeric additives. Prerequisite: approval of Department. (Fall)

311 **Nonsteady Flow** (3)

Fundamental equations of nonsteady viscous flow; frames of reference; Eulerian and Lagrangian methods. Boundary conditions; characteristics and waves, isentropic and nonisentropic disturbances; discontinuities, interactions, special transients. Piston theory and the oscillating airfoil. Nonsteady flows with viscosity and entropy gradients. Prerequisite: ME 235 or equivalent. (Fall)

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

312 Theory of Turbulence (3)

Concept of turbulence, theory of transition, stability, isotropic turbule free turbulence, turbulence shear flows, transport process in turb flow. Prerequisite: ME 227. (Fall)

315 Hypersonic Flow (3)

Small-disturbance theory, Newtonian theory; constant-density soluti theory of thin shock layers, flow over blunt bodies, hypersonic visc flow. Prerequisite: ME 227. (Fall)

317 Physical Gas Dynamics (3)

Molecular and atomic phenomena in gases, intermolecular forces, spec heats, equation of state for a real gas, dynamics of dissociating gas, radi tion. Prerequisite: ME 235; ME 295 or equivalent. (Spring)

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Science qualifying exa nation. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

ENGINEERING SCIENCE COURSES

*201 **History of Technology I** (3)

The characteristic technologies of Prehistory, the Ancient Near Ea Greece and Rome, Byzantium and Islam, and Christian Europe. Tech nology is broadly defined. Emphasis is on its manifold interactions wit other cultural forces. (Fall)

†202 **Advanced General Metrology** (3)

Topics in the conceptual, physical, and mathematical aspects of measure ment, standards, design for precision measurement and measurement o extreme values. Prerequisite: graduate status. (Fall—evening)

†203–4 **Probability and Statistics of Metrology** (3–3)

Probability distributions, discrete and continuous distributions; samplin combinatorial analysis; stochastic processes; conditional probability; co relation; analysis of variance; design and analysis of experiments; Lati Square experiments; factorial experiments; block and lattice design. Pre requisite: Ap S 115 or equivalent. (Academic year—evening)

209 **Technical and Environmental Risk Assessment, Control, and Insurance** (3)

Principles of risk assessment and control with respect to high-risk tech nological systems and environmental effects such as windstorms, earth quakes, and floods. Risk-control and disaster mitigation. Risk assessment and insurance. Prerequisite: Ap S 115 and approval of Department. (Fall)

*211 **History of Technology II** (3)

The development of the technology of the Atlantic community and it increasing influence throughout the world. Technology is broadly defined

* May be taken for undergraduate credit as an elective in the humanities.
† Offered at NASA-Langley Research Center; may be offered on campus when arranged.

Emphasis is on its manifold interactions with other cultural forces. (Spring)

221 Theory of Elasticity I (3)

Infinitesimal strain and compatibility; stress, constitutive relations for isotropic solids, displacement and stress formulation of boundary-value problems, energy principles, the reciprocal theorem, elements of pure torsion and flexure of rods; plane problems in elastostatics and dynamics illustrating stress function and Fourier transform methods. Prerequisite: approval of Department. (Fall)

222 Theory of Elasticity II (3)

Complex variable methods in plane static and dynamic problems; introduction to three-dimensional elastostatics, displacement potentials of Kelvin, Papkovich, and Galerkin; classical problems of Kelvin, Boussinesq, and Mindlin; Love's strain function and integral transform methods for axially symmetric problems; Somogliana and Betti integrals. Introduction to thermoelasticity. Prerequisite: Ap S 211; Ap S 213 (which may be taken concurrently); ES 221. (Spring)

228 Physical Oceanography (3)

Seawater, equations of motion, interaction between air and sea, currents, wind-waves in deep and shallow waters, long ocean waves, tides, wave-statistics, sea ice. Prerequisite: ME 221 or equivalent. (Spring)

231 Solid State for Engineers (3)

Crystal structure and binding, elastic constants, lattice vibrations, thermal properties, free electron theory of metals, band theory of solids, semiconductors, rectifiers and transistors, superconductivity. Prerequisite: approval of Department. (Fall)

232 Advanced Materials Science (3)

Simple crystal structures; the defect crystal structure—point defects, line defects, surface defects; grain-boundaries; X-ray and electron diffraction; diffusion in solids, metallic solutions, and compounds; ceramics; polymeric materials; elastic properties; internal friction; geometry, statics, and dynamics of dislocations; microplasticity, plasticity, work-hardening, and fatigue; creep; strengthening mechanisms; radiation damage; cohesive strength. Prerequisite: approval of Department. (Spring)

233 Superconductivity and Electron Transport (3)

Electromagnetic concepts, second quantization-creation and destruction operators, thermodynamic theories. The intermediate state (Type I superconductors), transport phenomena, the mixed state (Type II superconductors). Statistical and quantum superconductivity. Microscopic theory of superconductivity. Persistent currents. Properties of metallic superconductors, thin films; metallurgical aspects, intercalation and sandwiching. Organic superconductivity. Prerequisite: ES 231. (Spring)

234 Composite Materials (3)

Principles of composites and composite reinforcement; micromechanics and failure; interface reactions in various composites; reinforcing materials; structure of composites—fiber-reinforced polymers, filler-reinforced polymers, fiber-reinforced metals, directionally solidified alloys, dispersion-strengthened metals. Prerequisite: approval of Department. (Spring)

235 Physical Metallurgy (3)

Relations among structures, properties, and reactions of metals and alloys; structures and equilibria, kinematics of physical and chemical reactions, plastic deformation mechanisms, diffusion, solid reactions; phase diagrams and phase transformations, recrystallization and grain growth; dislocations—their formation and multiplication in crystal structures; elementary strengthening mechanisms. Prerequisite: approval of Department. (Spring)

***237 Quantum Mechanical Treatment of Metals (3)**

Elements of quantum mechanics, including Schroedinger equation and elementary perturbation theory. Applications to basic processes in the theory of solids: lattice waves, electron states, electron-electron and electron-phonon interactions. Boltzmann equation and transport properties. Fermi surfaces; theory of superconductivity. Prerequisite: ES 231 or approval of Department. (Spring)

***239 Physical Ceramics (3)**

Crystal chemistry and the systematic study of the structure of ceramic materials; solid reactions occurring at elevated temperatures; sintering, vitrification, diffusional mechanisms and effects; reaction rate theory; elastic, anelastic, and plastic properties of ionic and covalent solids; viscoelastic behavior of vitreous and vitreous-solid systems; phase equilibria of ceramic systems. Prerequisite: approval of Department. (Spring)

240 Fracture Mechanics (3)

Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture, linear elastic systems, plasticity considerations, fracture toughness, engineering analysis, notch strength analysis with limit approach, crack propagation laws, fatigue, fracture testing, comparison of recent continuum theories. Prerequisite: approval of Department. (Spring)

241 Fatigue (3)

Study of fatigue in materials, including metals, high-strength alloys, and composite materials. Strain hardening and softening, crack initiation and propagation metallographic effects, fatigue fracture and statistical aspects. Prerequisite: approval of Department. (Fall)

242 Materials Recycling and Recovery (3)

Study of the techniques and technology necessary to recover materials for reuse; emphasis on those materials in critical supply and on situations where continued use of virgin material will cause degradation of the environment. Consideration of economic factors affecting recovered resource price such as energy consumption, transportation, tax advantages or disadvantages, suitability of resultant products, and market demand. (As arranged)

251–52 Transportation (3–3)

(Formerly ME 251–52)

A "workshop" for the study of the problems of urban and interurban transportation; identification of the problems of mass transportation and assessment of alternative solutions. Topics for discussion include the nontechnological requirements and constraints of mass transportation and the technological problems of power supply, propulsion, support and se

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

pension, guidance and control, guideways and stations. Prerequisite: approval of Department. (Academic year)

256 **Introduction to the Theories of Inelastic Media** (3)

Physical basis of anelasticity, viscoelasticity, plasticity, and viscoplasticity; constitutive equations of elastic and viscoelastic media; foundations of the theories of plasticity and viscoplasticity; boundary-value problems and wave propagation in inelastic media. Prerequisite: Ap S 213 or equivalent and approval of Department. (Spring)

*263 **Atmospheric Physics for Engineers** (3)

Introduction to physical processes in the earth's atmosphere; comparisons to the atmospheres of other planets. Topics: evolution, structure, dynamics, visible phenomena, the ionosphere, and radiation processes. Prerequisite: approval of Department. (As arranged)

270 **Introduction to Acoustics** (3)

Waves in an infinite homogeneous medium; sound transmission in layer media and through structure, source, and dipole fields; sound propagation in ducts and enclosures; sound propagation through atmosphere and acoustic absorptions, acoustic circuit elements; acoustic transducers; introduction to acoustic measurements. Prerequisite: approval of Department. (As arranged)

*271 **Random Process Theory I** (3)

Random processes; stationarity and ergodicity; mean-square calculus; auto- and cross-correlations and spectra; random processes in linear systems; mean-square estimation, prediction and filtering; zero and level crossings and peak distributions; applications in aerospace sciences. Prerequisite: ES 203 or approval of Department.

*272 **Random Process Theory II** (3)

Discrete and continuous state Markov-processes; chains, queues, diffusion, and passage problems; linear and nonlinear estimation and stochastic control; estimation of correlations and power spectra; applications in communication theory; scattering from random surfaces; stochastic linearization and stability. Prerequisite: ES 271. (As arranged)

*273 **Time Series Analysis** (3)

Harmonic analysis of deterministic and random signals; auto- and cross-correlations and spectra; periodogram, Blackman-Tukey and direct filtering methods of spectral estimation; effects of finite length and digitization; variability; coherence. Fast Fourier transform techniques; applications in moder technology. Prerequisite: ES 271 or approval of Department.

274 **Noise and Vibration Control** (3)

Introduction to the physical effects of noise and vibration on man, practical sources of noise and their control; building noise, ventilation system noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. Prerequisite: ES 270, ME 215. (As arranged)

*275 **Advanced Theoretical Acoustics** (3)

Acoustic wave motion, several methods of solving inhomogeneous wave

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

equation, theory of sources, scattering and diffraction, duct propagation, introduction to acoustically coupled systems, acoustics in moving media. Prerequisite: Ap S 213, ES 270. (As arranged)

*276 **Acoustical and Mechanical Measurements** (3)

Characteristics of signals, basic transducer elements, standards of measurements and calibrations, signal recording and processing, acoustical and vibration instrumentation, vibration exciters, vibration testing techniques, flow mechanical measurements. Prerequisite: ES 270, ME 215. (As arranged)

*277 **Physical Acoustics** (3)

Concepts of continuum mechanics and thermodynamics, wave propagation in real media, thermal viscous and relaxational attenuations, piezoelectric crystals and ultrasonics, wave propagation in rigid and deformable porous media. Prerequisite: ES 275. (As arranged)

*278 **Psychological and Physiological Acoustics** (3)

Auditory system and its response to sound, experimental methodology in psychoacoustics, subjective response to sound, environmental noise and its evaluation, criteria for the prediction of noise nuisance, nonauditory system response to noise. Prerequisite: approval of Department. (As arranged)

*279 **Human Factors in Engineering** (3)

Man-machine interface, effects of physical stresses on human behavior and performance, life support system, learning and conditioning of physical stresses. (Spring)

*280 **Special Topics in Acoustics** (3)

Current methods and problems in acoustics. Topics chosen from such areas as aerospace noise generation and control; instruments and procedures for acoustics measurements; and responses of structures, people, and communities to noise. Prerequisite: approval of Department. (As arranged)

282 **Computer-aided Design** (3)

Fundamental concepts in the development of computational algorithms for the design of structures, machine component and assemblies, and other engineering systems. Representation of the design process and design specifications as a network of decision tables and logical flags. Optimization techniques and algorithms in design applications. Interactive computer-aided design methods based on the use of remote access computer terminals. General purpose computer programs for engineering analysis and design. Students, individually or in groups, are required to develop a small-scale general-purpose design program in an appropriate area such as structural design, machine design, urban planning, environmental quality control, etc. Prerequisite: CE 210 or equivalent and approval of Department. (Spring)

283 **Application of Computer Graphics in Engineering** (3)

Curve-fitting techniques as applied to computer graphics; construction of a library of geometric lines and curves connecting a series of discrete points. Representation of two- and three-dimensional geometrical shapes by a set of discrete points. Automatic generation and display on CRT screen of

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

geometrical shapes consisting of a grid of discrete points interconnected by user-selected geometric shapes. Automatic mesh generation, transformations, projections, and the concept of "hidden" lines. Use of remote computer terminals and graphic plotter equipment in interactive computer-graphics applications. Prerequisite or concurrent registration: ES 282, 284. (Fall)

284 **Numerical Methods in Engineering** (3)

Review of programming fundamentals: matrix operations and solution of simultaneous equations: difference methods and computer solution of ordinary and partial differential equations: numerical solution of initial and boundary-value problems in heat transfer, fluid flow, and structural mechanics. Prerequisite: Ap S 213 or equivalent. (Fall)

285 **Finite Element Methods in Engineering Mechanics** (3)

Derivation of fundamental equations based on energy formulation: stiffness properties of basic finite elements; solution of problems in plane stress and strain, plane- and space-framed structures; plate and shell structures; elastoplastic and dynamic analysis. Prerequisite: CE 210 or ES 222, or equivalent. (Spring)

*286 **Analysis and Design of Thin-walled Structures** (3)

Statistics of thin-walled beams and panels, force interplay between stiffeners and skin in the analysis and design of stiffened thin-walled structures; strength and stiffness of locally buckled stiffened structures; classification of loads and safety factors; different considerations governing the design of thin-walled structures; critical evaluation of various structural design procedures. Prerequisite: CE 261, 263; ES 285. (As arranged)

*287 **Automated Design of Complex Structures** (3)

Review of techniques for automated design including mathematical programming, fully stressed design, and optimality criteria; application of automated design techniques to stiffened and composite shell-type structures; multiple-load conditions and design constraints. Prerequisite: approval of Department. (As arranged)

289 **Special Topics in Theoretical and Applied Mechanics** (3)
(Formerly Special Topics in Structural Design)

Selected topics in theoretical and applied mechanics: (1) advanced analytical mechanics, (2) nonlinear mechanics, (3) nonlinear mechanics of continua, (4) wave propagation in solids, or (5) other appropriate topics. May be repeated for credit. Prerequisite: approval of Department. (As arranged)

298 **Research** (arr.)

Basic research projects as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

*310 **Aeroacoustics** (3)

General theory of aerodynamic sound generation and propagation, Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise, boundary layer noise, fan and compressor noise, helicopter

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.

noise, sonic booms. Current problems in aeroacoustics. Prerequisite: ES 275. (As arranged)

*311 **Nonlinear Acoustics** (3)

Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing walls. Prerequisite: approval of Department. (As arranged)

*312 **Theory of Random Vibration** (3)

Response of linear systems to stationary random inputs. Failures resulting from dynamic response. Response of space vehicle structures to intense noise fields, measurement, and application. Prerequisite: ES 271, ME 215. (As arranged)

*313 **Structural Acoustic Interaction** (3)

Coupled response of structures to sound, system of infinite extent, system of finite extent, sound radiation from structure, sound transmission through structure. Panel response to turbulent boundary-layer excitation. Sound radiation from mechanically excited structure vibration. Prerequisite: ES 270, 312. (As arranged)

398 **Advanced Reading and Research** (arr.)

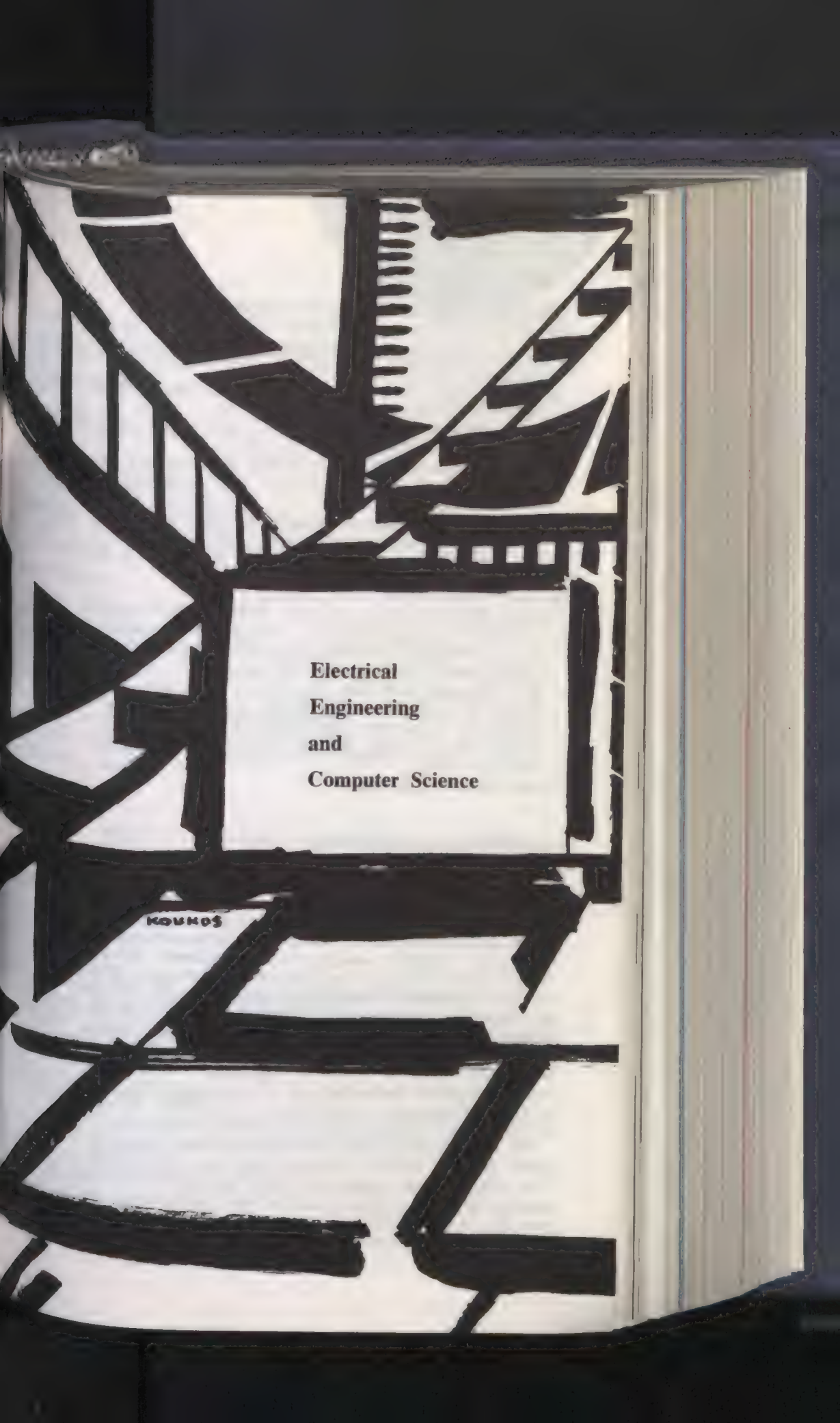
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research (arr.)**

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.




Electrical
Engineering
and
Computer Science
KOUKOS

Electrical Engineering and Computer Science

Professors R.B. Heller, W.K. Kahn *(Chairman)*, Raymond Pickholtz, Harr
Van Trees *(Visiting)*
Adjunct Professors F.K. Harris, C.A. Caceres, Charles Feldman, Ernst Weber
John Pasta, Elmer Lipsey, George Rappaport
Professorial Lecturers W.F. Croswell, S.J. Raff, P.H. Enslow, Jr., P.R. Gelf
M.S. Ghausi, J.F. Halldane, Guenther Hintze
Associate Professors E.H. Braun, Marvin Eisenberg, A.C. Meltzer, Nichol
Kyriakopoulos, Vallobh Vimolvanich, R.H. Lang, W.D. Maurer, Abdu
fattah Abd-alla
Associate Professorial Lecturers C.L. Fricke, J.P. Fennell, Wasyl Wasylkiwsky
B.M. Horowitz, Leonard Schuchman, A.R. Shulman, W.H. Carter, Alle
Das, R.H. Thompson, P.J. Martin, J.W. Schwartz, R.L. Stermer, Jr., Da
Arnstein, H.L. Hopewell, Jr.
Assistant Professors N.A. Sloan, Ting Lee
Assistant Professorial Lecturers D.C. Rohlfs, W.H. Fuhr, J.H. O'Hara, JJ
Rocchio, Jr., George Saxton, J.A. Friedhoffer, R.E. Merwin, H.F. Mitchel
Jr., J.L. Wolfgang, Jr., Pi-Fuay Chen, R.E. Lyons, Iwao Sugai, W.J. Engis
Gerald Farmer, W.C. Scales, J.W. Benoit, G.W. Haigler, J.R. Silverma
W.T. Bisignani, R.M. Fish, Ram Khatri, J.J. Salasin, R.E. Schneider, JW
Woods, W.A. MacDonald, J.J. Bisaga, C.S. Maiorana, Mahendra Shah, FD
Moore, E.S. Armstrong, J.I. Cleveland II, J.E. Hogge, Maurice Morin, JV
Russell III, C.T. Swift, J.H. Tucker, C.E. Dunham, Irving Haber, Irwin
Horn, P.J. Nahin
Special Lecturer Peter Bock

UNDERGRADUATE STUDY

Electrical engineering is a branch of engineering in which practical as well
theoretical and scientific aspects are integrated to provide a well-balanced dis
cipline. Basic sciences such as physics and mathematics form the roots of
which electrical engineering builds to create a truly applied science and
develop the techniques necessary to solve problems. Analysis, synthesis, and
design go hand in hand. The electrical engineering curriculum is designed to
provide the student with such an integrated approach. The first two years of
the curriculum are common to all undergraduate fields in the School and are
devoted to developing a sound foundation of basic sciences coupled with
engineering sciences. The third year continues with engineering sciences and
starts going deeper into electrical engineering. The fourth year is totally de
voted to electrical engineering. At the fourth year the student has a choice
of either following the regular electrical engineering curriculum or branching
off into an area of concentration in computer science.

The Department of Electrical Engineering and Computer Science has re
cently acquired modern laboratory equipment, including its own computer.
The student has an opportunity during his last year to work on individual
projects where his ingenuity, coupled with faculty advice and guidance, per
mits him to concentrate in areas such as computers, communications, micro
waves, controls, electronics, medical engineering, circuits, and others.

The scheduling of courses has been arranged to accommodate both the full-time and the part-time student. Undergraduate courses are offered once a year during the day for full-time students, and once every two years in the evening for part-time students.

SUBJECT AREAS

Networks

EE 11: Linear Networks I
EE 12: Linear Networks II
EE 113: Network Analysis and Design
EE 114: Linear Active Networks

Fields and Waves

EE 31: Fields and Waves I
EE 32: Fields and Waves II
EE 133: Electromagnetic Waves

Electronics

EE 20: Introductory Engineering Electronics
EE 121: Engineering Electronics and Design
EE 122: Pulse and Waveshaping Electronic Design
EE 124: Electronic Devices

Communications

EE 143: Elements of Communication Engineering I
EE 144: Elements of Communication Engineering II

Computer Science

EE 51: Applications of Computers
EE 152: Introduction to Digital Computers
EE 153: Design of Switching Systems
EE 154: Digital Computer Design
EE 155: Introduction to Numerical Methods for Computers
EE 156: Introduction to Systems Programming
EE 157: Machine and Assembly Language Programming
EE 158: Algorithmic Methods and High-level Languages
EE 159: Programming and Data Structures

Laboratories and Measurement

EE 60: Introductory Electrical Engineering Laboratory I
EE 61: Introductory Electrical Engineering Laboratory II
EE 160: Electrical Measurements
EE 161–62: Electrical Engineering Laboratory

Controls and Systems

EE 172: Control Systems
EE 177: Electrical Energy Conversion

Medical Engineering

EE 184: Introduction to Medical Engineering

CORE CURRICULUM

Normally the first four semesters are common to all undergraduate fields in the School of Engineering and Applied Science.

First Semester

EE 51:	Applications of Computers (3)
Math 30:	Precalculus (3)
Math 31:	Calculus of One Variable (3)
Phys 1:	General Physics (4)
Elective:	Selected from humanities or social sciences (3)

Second Semester

EE 52:	Computers and Societal Problems (3)
or ES 4:	Descriptive Geometry and Drafting (3)
Engl 9 or 10:	English Composition: Language as Communication (3)
Math 32:	Calculus of Several Variables (3)
Phys 2:	Introduction to Modern Physics (4)
Elective:	Selected from humanities or social sciences (3)

Third Semester

Ap S 57:	Analytical Mechanics I (2)
Ap S 113:	Engineering Analysis I (3)
Ap S 115:	Engineering Analysis III (3)
Chem 13:	General Chemistry (4)
Elective:	Selected from humanities or social sciences (3)

Fourth Semester

Ap S 58:	Analytical Mechanics II (3)
Ap S 114:	Engineering Analysis II (3)
CE 110:	Introduction to Environmental Engineering (3)
or EE 11:	Linear Networks I (3)
CE 140:	Materials Science (3)
Phys 32:	Introduction to Theoretical Physics (3)
Elective:	Selected from humanities or social sciences (3)

ELECTRICAL ENGINEERING CURRICULUM

Fifth Semester

EE 12:	Linear Networks II (3)
EE 20:	Introductory Engineering Electronics (3)
EE 31:	Fields and Waves I (3)
EE 60:	Introductory Electrical Engineering Laboratory I (2)
EE 157:	Machine and Assembly Language Programming (3)
Elective:	Selected from humanities or social sciences (3)

Sixth Semester

EE 32: Fields and Waves II (3)
EE 61: Introductory Electrical Engineering Laboratory II (2)
EE 121: Engineering Electronics and Design (3)
EE 152: Introduction to Digital Computers (3)
EE 177: Electrical Energy Conversion (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

EE 122: Pulse and Waveshaping Electronic Design (3)
EE 143: Elements of Communication Engineering I (3)
EE 161: Electrical Engineering Laboratory (2)
Elective: Technical electives (9) (three courses selected from EE 113, 133, 153; ME 131, 187)

Eighth Semester

EE 144: Elements of Communication Engineering II (3)
EE 162: Electrical Engineering Laboratory (2)
EE 172: Control Systems (3)
Elective: Technical electives (6) (two courses selected from EE 114, 124, 155, 184; ME 194)

Technical Electives

EE 113: Network Analysis and Design (3)
EE 114: Linear Active Networks (3)
EE 124: Electronic Devices (3)
EE 133: Electromagnetic Waves (3)
EE 153: Design of Switching Systems (3)
EE 155: Introduction to Numerical Methods for Computers (3)
EE 184: Introduction to Medical Engineering (3)
ME 131: Thermodynamics (3)
ME 187: Heat Transfer Theory (3)
ME 194: Energy Conversion (3)

Computer Science Option

Computer science is a new and developing discipline which combines the electronic design and mathematical utilization of computers into a single comprehensive area. The student who completes this option will be able to design both the hardware and software needed for large-scale computing systems. The curriculum prepares the student for graduate school or for a career in computer design and applications.

CURRICULUM

Prerequisite: first four semesters as described in the Core Curriculum, see page 98.

Fifth Semester

EE 12: Linear Networks II (3)

EE 20:	Introductory Engineering Electronics (3)
EE 31:	Fields and Waves I (3)
EE 60:	Introductory Electrical Engineering Laboratory I (2)
EE 157:	Machine and Assembly Language Programming (3)
Elective:	Selected from humanities or social sciences (3)

Sixth Semester

EE 32:	Fields and Waves II (3)
EE 61:	Introductory Electrical Engineering Laboratory II (2)
EE 121:	Engineering Electronics and Design (3)
EE 152:	Introduction to Digital Computers (3)
EE 177:	Electrical Energy Conversion (3)
Elective:	Selected from humanities or social sciences (3)

Seventh Semester

EE 122:	Pulse and Waveshaping Electronic Design (3)
EE 153:	Design of Switching Systems (3)
EE 158:	Algorithmic Methods and High-level Languages (3)
EE 159:	Programming and Data Structures (3)
EE 161:	Electrical Engineering Laboratory (2)
Elective:	Technical elective (3) (one course selected from EE 113, 133, 143)

Eighth Semester

EE 154:	Digital Computer Design (3)
EE 156:	Introduction to Systems Programming (3)
EE 162:	Electrical Engineering Laboratory (2)
EE 172:	Control Systems (3)
Elective:	Technical elective (3) (one course selected from EE 114, 124, 144, 155, 184)

Technical Electives

EE 113:	Network Analysis and Design (3)
EE 114:	Linear Active Networks (3)
EE 124:	Electronic Devices (3)
EE 133:	Electromagnetic Waves (3)
EE 143:	Elements of Communication Engineering I (3)
EE 144:	Elements of Communication Engineering II (3)
EE 155:	Introduction to Numerical Methods for Computers (3)
EE 184:	Introduction to Medical Engineering (3)

ELECTRICAL ENGINEERING COURSES

11 Linear Networks I (3)

Signals and waveforms, average value and RMS, network concepts, elements, and parameters. Kirchhoff's laws, simple networks, energy and power, differential equations of networks and their solution, phasors and steady-state analysis, measurement impedance concepts, resonance, and filtering. Prerequisite or concurrent registration: Ap S 114. (Spring

12 Linear Networks II (3)

Singular functions; Laplace transform; network functions, poles and zeros;

total response; time and frequency domains; convolution theorems; Fourier analysis, spectra; frequency response, Bode plots; two-port parameters. Prerequisite: Ap S 114, EE 11. (Offered every spring—day; spring 1975 and alternate springs—evening)

20 **Introductory Engineering Electronics** (3)

Various types of devices used in electronic engineering considered from the point of view of the physics of their operation and from the engineering point of view of their application to electronic circuits. Solid-state, vacuum, and gaseous devices. Primary emphasis on application of these elements in power supplies and in linear amplifiers. Introduction of design concepts through use of graphical techniques. Prerequisite: EE 11. (Spring—day and evening)

31 **Fields and Waves I** (3)

Vector calculus, orthogonal coordinates, Coulomb's and Gauss' laws, scalar potential, dipoles, method of images, Laplace's and Poisson's equations, boundary-value problems. Prerequisite: Phys 32. Prerequisite or concurrent registration: Ap S 114. (Offered every fall—day; fall 1974 and alternate falls—evening)

32 **Fields and Waves II** (3)

Biot-Savart law, Ampere's law, vector potential, magnets, polarization and polarization currents, Faraday's law, Maxwell's equations, plane waves, and Poynting vector. Prerequisite: EE 31. (Offered every spring—day; spring 1975 and alternate springs—evening)

51 **Applications of Computers** (3) (Same as CS 51)

Solution of problems on digital computers, using machine language and FORTRAN; data processing concepts and numerical methods. Writing, debugging, and running programs on a digital computer. (Fall—evening; spring—day and evening)

52 **Computers and Societal Problems** (3) (Same as CS 52)

Use of the digital computer in the analysis and modeling of social and urban systems. Applications of analytical methods to the solution of environmental and economic problems. Computer methods used in the simulation of physical, ecological, social, urban, and economic systems. Students formulate problems and simulate systems on a digital computer in order to obtain solutions. Prerequisite: CS or EE 51 and two years of college preparatory mathematics. (Spring)

60 **Introductory Electrical Engineering Laboratory I** (2)

Use, theory of design, and application of standard electronic laboratory equipment; applications of instrumentation through experiments in basic network theorems; measurement of electrical quantities and characteristics of electrical devices. Prerequisite or concurrent registration: EE 11, 31. (Fall—day and evening)

61 **Introductory Electrical Engineering Laboratory II** (2)

Characteristics of electronic devices and circuits; design of electronic amplifiers and measurement of their properties; experiments in support of courses in networks, fields, and electronics. Prerequisite or concurrent registration: EE 12, 20, 60. (Offered every spring—day; spring 1975 and alternate springs—evening)

113 Network Analysis and Design (3)

Application of matrices and linear graphs to electrical networks; tree circuits, cut-sets; network equations; signal-flow graphs; introduction state-space techniques; computer solutions; network transfer functions properties and synthesis of two-element, one-port networks; filter theo and design; computer-aided circuit design. Prerequisite: EE 12, 20. (Offered every fall—day; fall 1974 and alternate falls—evening)

114 Linear Active Networks (3)

Description of networks by terminal and port concepts; power and scat tering parameters; analysis of active networks, including negative impe ance converters, gyrators, etc.; interconnection of networks; properties o active networks, including reciprocity, stability, activity, and feedback. Pre requisite: EE 113. May be taken for graduate credit. (Offered every spring—day; spring 1975 and alternate springs—evening)

121 Engineering Electronics and Design (3)

Graphical analysis and design beyond the level covered in EE 20. Intro duction of incremental analysis and design methods to electronic circuits use of equivalent circuits; amplifiers, oscillators, modulation and demod ulation. Prerequisite: EE 20. (Offered every fall—day; fall 1974 and alternate falls—evening)

122 Pulse and Waveshaping Electronic Design (3)

Introduction to and design of nonlinear circuits used in modern-day computer and communications systems. Pulse, sweep, switching, and logic circuits; counting and timing circuits. Prerequisite: EE 121. (Offered every spring—day; spring 1975 and alternate springs—evening)

124 Electronic Devices (3)

Principles of operation of electronic devices used in electrical networks, communication systems, and electronic circuits. Properties of electronic devices and their applications. Modeling of devices such as diodes, transistors, and lasers. Fabrication methods of discrete components and integrated circuits. Prerequisite: EE 12, 20, 31; Phys 32. (Spring 1976 and alternate springs)

133 Electromagnetic Waves (3)

Time-harmonic Maxwell equations, complex Poynting vector, transmission lines, characteristics of common waveguides, resonant cavities, Smith chart, Lorentz reciprocity, simple antennas, linear antenna arrays. Prerequisite: EE 32. (Fall—day)

143 Elements of Communication Engineering I (3)

Fourier series and transforms; power spectra and correlation; principles of modulation; amplitude, angle, and pulse modulation; modulation and demodulation systems; time and frequency division multiplexing. Prerequisite or concurrent registration: EE 113, 121. (Offered every fall—day; fall 1975 and alternate falls—evening)

144 Elements of Communication Engineering II (3)

Introduction to the statistical theory of communication, random signals and noise, concepts of information theory, transmission of information over noisy channels, comparison of modulation systems in the presence of noise. Prerequisite: EE 143. (Offered every spring—day; spring 1976 and alternate springs—evening)

152 **Introduction to Digital Computers** (3) (Same as CS 152)

Introduction to the use and structure of minicomputers and larger computers. Boolean algebra and the design of combinational switching circuits. Number systems, codes, and arithmetic operations in digital computers. Digital computer subsystems and their interconnections. Interfacing equipment to a minicomputer; timing, control, and electronic requirements. Introduction to programming analog computers; analog computer components; analog-to-digital conversion. Prerequisite: CS or EE 157. (Offered every spring—day; spring 1976 and alternate springs—evening)

153 **Design of Switching Systems** (3) (Same as CS 153)

Switching algebra and Boolean logic; sets, relations, and lattices. Analysis and design of switching devices; design of combinational logic networks. Minimization techniques and decomposition methods. Electronic implementation of logic; contact networks, symmetric functions, and threshold logic. Reliable design and fault-detection tests. Number systems and codes, geometric interpretation, error detecting and correcting codes; encoders and decoders. Logic and electronic design of functional digital units. Sequential circuits and iterative networks. Minimization and transformation of sequential machines; structure of sequential machines; partitions and covers. State identification and fault-detection experiments. Prerequisite: CS or EE 152 or permission of instructor. May be taken for graduate credit. (Fall—day and evening)

154 **Digital Computer Design** (3) (Same as CS 154)

Logic and electronic design of functional digital units. Design of digital computer subsystems, flow of information and logical flow diagrams in timing and control signals. Design of binary and decimal, serial and parallel digital arithmetic units. Design of memory subsystems, channels, I/O, and storage subsystems. Design of the control unit of a digital computer. Introduction to microprogramming. Design of a small digital computer. Prerequisite: CS or EE 153 or permission of instructor. May be taken for graduate credit. (Spring—day and evening)

155 **Introduction to Numerical Methods for Computers** (3) (Same as CS 155)

Use of numerical methods in engineering and scientific problems. Concepts of algorithm and flowchart, errors in computer and numerical methods. Introduction to numerical methods for the solution of simultaneous linear algebraic equations, roots of equations, determination of eigenvalues and eigenvectors, numerical differentiation and integration, interpolation and solution of ordinary and partial differential equations. Statistical methods for the evaluation of experimental data and correlation techniques, curve fitting. Prerequisite: Ap S 114, CS or EE 51; or equivalent. (Offered every spring—day; spring 1975 and alternate springs—evening)

156 **Introduction to Systems Programming** (3) (Same as CS 156)

Introduction to computer software systems; concepts in the use of macro-assemblers, loaders, monitors; dispatchers, initiators, and executive system. Control of input-output in a multiprogrammed batch environment. Control of the job, task, job stream, and secondary storage subsystem. Introduction to simulation and simulation languages. Prerequisite or concurrent registration: CS or EE 159. (Offered every spring—day; spring 1975 and alternate springs—evening)

157 **Machine and Assembly Language Programming** (3) (Same as CS 157)

Machine and assembly language programming for minicomputers and multiprogrammed large computers. Techniques in on-line terminal programming. Methods of addressing and machine control for fixed and variable word length computers. Input-output control and programming for minicomputers. Use of a macro-assembler, subroutine linkages, routines, reentrant and recursive routines. Methods of editing and debugging. Characteristics of minicomputer structure. Prerequisite: CS or EE 51 or equivalent. (Offered every fall—day; fall 1975 and alternate falls—evening)

158 **Algorithmic Methods and High-level Languages** (3) (Same as CS 158)

Introduction to high-level procedural and problem-oriented languages. Comparison of computer languages and their structure. Introduction to compiler structure and parsing of compiler statements. Reentrant programming and reentrant compilers. Correctness of programs. Syntax of high-level languages and their recognizers. Introduction to deterministic and probabilistic simulation and simulation languages. Introduction to heuristic programming. Prerequisite or concurrent registration: CS or EE 157, 159; or permission of instructor. May be taken for graduate credit. (Fall—day and evening)

159 **Programming and Data Structures** (3) (Same as CS 159)

Introduction to discrete structures and data structures in computing. Use of tree structures, arrays, lists, pushdown stacks, files, strings, and linked data structures. Sorting, searching, hashing, and merging of data files. Use of a macro-assembler to structure data. Data management and data storage. Use of buffers and buffer management. Input-output of data files. List and string processing languages and recursive programs. Access methods and operating system procedures for use with data structures and macro-assemblers. Prerequisite: CS or EE 157 or equivalent, or permission of instructor. (Fall—day and evening)

160 **Electrical Measurements** (3)

Electrical measurements, from direct current through radio frequencies, techniques; detectors; bridges; measurement of current, voltage, power, resistance, capacitance, inductance, energy, phase angle, frequency, and time. dielectric and magnetic measurements; topics in high-frequency measurement, including field strength, signal-to-noise ratio, impedance, attenuation. Prerequisite: EE 12, 20. (Spring—evening)

161–62 **Electrical Engineering Laboratory** (2–2)

Experiments in support of courses in networks, electronics, microwaves, computers, communications, controls, and machines. The student is required to begin a design project in the first half of the course; the completion of this project is the major effort of the second half. Prerequisite or concurrent registration: EE 61, 113, 121; CS or EE 152. EE 161 is prerequisite to EE 162. (Academic year—day and evening)

172 **Control Systems** (3)

Mathematical models of linear systems; steady-state and transient analyses, root locus and frequency response methods; synthesis of linear feedback control systems. Prerequisite: Ap S 114, EE 11. (Offered every spring —day; spring 1975 and alternate springs—evening)

177 Electrical Energy Conversion (3)

Fundamentals of electromechanical energy conversion. Electromechanical transducers and their equivalent circuits, three-phase and single-phase a-c rotating machines, d-c machines, rotating machines as circuit elements. Prerequisite: EE 12. (Offered every fall—day; fall 1975 and alternate falls—evening)

184 Introduction to Medical Engineering (3)

Designed to introduce the engineering or physical sciences student to the applications of engineering in the medical sciences; terminology of the medical profession emphasized; the physiology of the human body presented from over-all systems or functional approach; survey of present-day medical measurements and consideration of those areas in which engineering may be applied advantageously to medicine. May be taken for graduate credit. Admission by permission of instructor. (Fall—day and evening)

198 Research (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

COMPUTER SCIENCE COURSES

51 Applications of Computers (3) (Same as EE 51)

Solution of problems on digital computers, using machine language and FORTRAN; data processing concepts and numerical methods. Writing, debugging, and running programs on a digital computer. (Fall—evening; spring—day and evening)

52 Computers and Societal Problems (3) (Same as EE 52)

Use of the digital computer in the analysis and modeling of social and urban systems. Applications of analytical methods to the solution of environmental and economic problems. Computer methods used in the simulation of physical, ecological, social, urban, and economic systems. Students formulate problems and simulate systems on a digital computer in order to obtain solutions. Prerequisite: CS or EE 51 and two years of college preparatory mathematics. (Spring)

152 Introduction to Digital Computers (3) (Same as EE 152)

Introduction to the use and structure of minicomputers and larger computers. Boolean algebra and the design of combinational switching circuits. Number systems, codes, and arithmetic operations in digital computers. Digital computer subsystems and their interconnections. Interfacing equipment to a minicomputer; timing, control, and electronic requirements. Introduction to programming analog computers; analog computer components; analog-to-digital conversion. Prerequisite: CS or EE 157. (Offered every spring—day; spring 1976 and alternate springs—evening)

153 Design of Switching Systems (3) (Same as EE 153)

Switching algebra and Boolean logic; sets, relations, and lattices. Analysis and design of switching devices; design of combinational logic networks. Minimization techniques and decomposition methods. Electronic implementation of logic; contact networks, symmetric functions, and threshold logic. Reliable design and fault-detection tests. Number systems and codes, geometric interpretation, error detecting and correcting codes; en-

coders and decoders. Logic and electronic design of functional digital units. Sequential circuits and iterative networks. Minimization and transformation of sequential machines; structure of sequential machines: partitions and covers. State identification and fault-detection experiments. Prerequisite: CS or EE 152 or permission of instructor. May be taken for graduate credit. (Fall—day and evening)

154 **Digital Computer Design** (3) (Same as EE 154)

Logic and electronic design of functional digital units. Design of digital computer subsystems, flow of information and logical flow diagrams of timing and control signals. Design of binary and decimal, serial and parallel digital arithmetic units. Design of memory subsystems, channels, I/O, and storage subsystems. Design of the control unit of a digital computer. Introduction to microprogramming. Design of a small digital computer. Prerequisite: CS or EE 153 or permission of instructor. May be taken for graduate credit. (Spring—day and evening)

155 **Introduction to Numerical Methods for Computers** (3) (Same as EE 155)

Use of numerical methods in engineering and scientific problems. Concepts of algorithm and flowchart, errors in computer and numerical methods. Introduction to numerical methods for the solution of simultaneous linear algebraic equations, roots of equations, determination of eigenvalues and eigenvectors, numerical differentiation and integration, interpolation and solution of ordinary and partial differential equations. Statistical methods for the evaluation of experimental data and correlation techniques, curve fitting. Prerequisite: Ap S 114, CS or EE 51; or equivalent. (Offered every spring—day; spring 1975 and alternate springs—evening)

156 **Introduction to Systems Programming** (3) (Same as EE 156)

Introduction to computer software systems; concepts in the use of macro-assemblers, loaders, monitors; dispatchers, initiators, and executive system. Control of input-output in a multiprogrammed batch environment. Control of the job, task, job stream, and secondary storage subsystem. Introduction to simulation and simulation languages. Prerequisite or concurrent registration: CS or EE 159. (Offered every spring—day; spring 1975 and alternate springs—evening)

157 **Machine and Assembly Language Programming** (3) (Same as EE 157)

Machine and assembly language programming for minicomputers and multiprogrammed large computers. Techniques in on-line terminal programming. Methods of addressing and machine control for fixed and variable word length computers. Input-output control and programming for minicomputers. Use of a macro-assembler, subroutine linkages, coroutines, reentrant and recursive routines. Methods of editing and debugging. Characteristics of minicomputer structure. Prerequisite: CS or EE 51 or equivalent. (Offered every fall—day; fall 1975 and alternate falls—evening)

158 **Algorithmic Methods and High-level Languages** (3) (Same as EE 158)

Introduction to high-level procedural and problem-oriented languages. Comparison of computer languages and their structure. Introduction to compiler structure and parsing of compiler statements. Reentrant programming and reentrant compilers. Correctness of programs. Syntax of

high-level languages and their recognizers. Introduction to deterministic and probabilistic simulation and simulation languages. Introduction to heuristic programming. Prerequisite or concurrent registration: CS or EE 157, 159; or permission of instructor. May be taken for graduate credit. **(Fall—day and evening)**

159 **Programming and Data Structures** (3) (Same as EE 159)

Introduction to discrete structures and data structures in computing. Use of tree structures, arrays, lists, pushdown stacks, files, strings, and linked data structures. Sorting, searching, hashing, and merging of data files. Use of macro-assembler to structure data. Data management and data storage. Use of buffers and buffer management. Input-output of data files. List and string processing languages and recursive programs. Access methods and operating system procedures for use with data structures and macro-assemblers. Prerequisite: CS or EE 157 or equivalent, or permission of instructor. **(Fall—day and evening)**

GRADUATE STUDY

Electrical engineering, at the graduate level, provides one of the most stimulating experiences in advanced studies. The student has reached a degree of maturity and basic knowledge that allows him to enter into new avenues of exciting work. Courses prepare the student in areas of concentration such as systems science, networks, and controls; electrophysics (electronics, fields and waves); communications; medical engineering; and computer science (hardware and software). Depending upon the interest of the student, some of the programs leading to the degree of Master of Science are given at the NASA-Langley Research Center, Langley Station, Hampton, Va. NASA-Langley's extensive scientific and engineering facilities and equipment are utilized whenever possible. Arrangements can also be made to use the facilities of the Naval Ship Research and Development Center, Annapolis, Md., where an off-campus Master's degree pilot program has been initiated.

The graduate programs are formulated to take into consideration the student's individual strengths, potentials, skills, aspirations, and abilities. Determined through consultation by the student and his faculty adviser, their purpose is to provide the student with a thorough understanding of his area of concentration and at the same time to provide him with the breadth of knowledge necessary in modern engineering.

The graduate programs are, in addition, designed to provide a needed educational service to the Washington technical community. Many of the courses have been developed after consultation with private industry and government agencies of the area. They are offered during both the afternoon and evening with a principle of rotation from year to year.

The Department of Electrical Engineering and Computer Science has continuously kept the graduate program up to date, through constant contact with recent developments, through its own research, and through the addition of several experts in appropriate fields serving as part-time and adjunct faculty. The Department provides a well-balanced, modern graduate program.

In order to provide the student with detailed information about its graduate programs, from the point of view of procedures, requirements, regulations, and

scope, the Department of Electrical Engineering and Computer Science p
lishes annually a detailed brochure to supplement the present catalogue.
addition, the Department publishes special pamphlets describing specific p
grams.

AREAS OF CONCENTRATION

Communications

EE 204:	Stochastic Signals and Noise
EE 205:	Stochastic Processes in Electrical Engineering
EE 241:	Information Theory
EE 242:	Coding Theory
EE 243:	Communication Theory I
EE 244:	Communication Theory II
EE 245:	Signal Detection and Estimation Theory
EE 246:	Digital Communications
EE 247:	Communication Systems
EE 248:	Microwave Communication Systems
EE 249:	Data Telecommunication Networks
EE 252:	Digital Signal Processing Techniques
EE 277:	Space Communication Systems
EE 298:	Research
EE 299–300:	Thesis Research
EE 349:	Communications Research
EE 399:	Dissertation Research

Computer Science (Hardware and Software)*

CS 201:	Introduction to Computer Systems I
CS 202:	Introduction to Computer Systems II
CS 214:	Data Structures
CS 215:	Computer Graphics and Pattern Recognition
CS 216:	Information Retrieval Systems
CS 223:	Simulation and Heuristics
CS 231:	Finite State Machines
CS 232:	Finite Automata
CS 237:	Computing Systems
CS 238:	Advanced Computing Systems
CS 239:	Comparative Computer Systems
CS 240:	Theory and Practice of Microprogramming
CS 263:	Digital Computer Programming Systems
CS 264:	Design of Compilers and High-level Languages
CS 267:	Operating Systems I
CS 268:	Operating Systems II
CS 278:	Analog and Hybrid Computers
CS 284:	Applications of Numerical Methods
†CS 285:	Approximation of Functions and Data Representations
CS 298:	Research
CS 299–300:	Thesis Research
CS 391:	Computer Science Research
CS 399:	Dissertation Research

* See also preparatory undergraduate courses in Electrical Engineering and Computer Science, pp. 100–107.

† Offered at NASA-Langley Research Center; may be offered on campus when arranged.

Electrophysics (Electronics, Fields and Waves)

EE 201: Natural Modes and Transients in Electrical Systems
EE 221: Physical Electronics I
EE 222: Physical Electronics II
EE 224: Quantum Electronics of Masers and Lasers
EE 225: Nonlinear Electronics
EE 226: Optical Electronics
EE 227: Industrial Electronics
EE 228: High-frequency Electronics
EE 229: Precise Optical Measurements
EE 230: Electromagnetic Theory
EE 231: Field Analysis and Potential Theory
EE 232: Electrodynamics
EE 233: Microwaves and Components
EE 234: Electromagnetic Wave Propagation
EE 235: Antennas
EE 236: Plasma Dynamics
EE 238: Precise Microwave Measurements
EE 239: Precise Electrical Standards
EE 255: Optical Processing
EE 256: Environmental Optics
EE 298: Research
EE 299–300: Thesis Research
EE 323: Principles of Microelectronics
EE 329: Electronics Research
EE 339: Fields and Waves Research
EE 399: Dissertation Research

Medical Engineering

EE 256: Environmental Optics
EE 281: Medical Instrumentation I
EE 282: Medical Instrumentation II
EE 283: Introduction to Medicine for Engineers I: Physiology and Anatomy
EE 284: Introduction to Medicine for Engineers II: Clinical Medicine
EE 285: Engineering in Physical Medicine and Rehabilitation
EE 286: Sensory Evoked Potentials
EE 287: Computer-aided Analysis of Physiological Signals
EE 288: Physiological Controls and Systems
EE 298: Research
EE 299–300: Thesis Research
EE 389: Medical Engineering Research
EE 399: Dissertation Research

Systems Science, Networks, and Controls

EE 201: Natural Modes and Transients in Electrical Systems
EE 202: Linear System Theory I
EE 203: Linear System Theory II
EE 204: Stochastic Signals and Noise
EE 205: Stochastic Processes in Electrical Engineering
EE 212: Advanced Network Analysis
EE 215: Linear Network Synthesis I
EE 216: Linear Network Synthesis II
EE 272: Discrete Systems
EE 273: System Optimization

EE 274: Nonlinear Systems
EE 275: System Identification and Adaptive Systems
EE 276: Cybernetics
EE 278: Spacecraft Systems Design
EE 298: Research
EE 299–300: Thesis Research
EE 319: Networks Research
EE 371: Simulation Methods for System Analysis
EE 372: Analysis and Control of Large Systems
EE 379: Controls and Systems Research
EE 399: Dissertation Research

ELECTRICAL ENGINEERING COURSES

201 Natural Modes and Transients in Electrical Systems (3)

Transient response and natural modes of electrical systems; techniques f analyzing systems with periodic and aperiodic inputs and outputs; sa pling. (Fall and spring)

202 Linear System Theory I (3)

Graph theory and its application to networks and systems; system descri tion in time and frequency domain; linear spaces and linear operato mathematical representation of linear systems; analytical and compu solutions of the state equations; transient and steady-state response. Pr requisite: graduate status. (Fall 1974 and alternate falls—day, fa 1975 and alternate falls—evening)

203 Linear System Theory II (3)

System properties; controlability and observability of linear systems; se sitivity and stability analyses. Irreducible realizations of rational transfe function matrices; canonical forms, state feedback, and state estimato Linear composite systems. Prerequisite: EE 202. (Fall 1974 and alte nate falls—day; spring 1976 and alternate springs—evening)

204 Stochastic Signals and Noise (3)

Probability, random variables, characteristic functions; transformations random variables and applications; sequences of random variables. line mean-squared estimation; stationary estimation, stationary random pro cesses, correlation functions, power spectrum; output of linear system with stochastic inputs; Gaussian processes. Applications drawn for com munications, control theory, computer science. (As arranged)

205 Stochastic Processes in Electrical Engineering (3)

Markov chains, state classification, Kolmogorov equation; applications probabilistic finite-state machines. Birth-death process, applications queuing theory, buffer problems, and the design of communication net Continuous state processes, diffusion processes, passage times, and estim tion problems. Estimation and power spectra. Stochastic difference differential equations. Applications to communication theory, contr theory, computer science, and propagation theory of random media. Pr requisite: EE 204 or equivalent. (As arranged)

212 Advanced Network Analysis (3)

Network theorems, network functions, relationship of parts of networ functions; network properties, realizability and causality concepts; com puter-aided network analysis. Prerequisite: EE 202 or equivalent. (Spring—evening)

215 **Linear Network Synthesis I (3)**

Properties and testing of positive real functions. Synthesis of LC, RL, RC one-port networks. Brune, Bott-Duffin, Miyata, Kuh, and Darlington synthesis techniques. Introduction to two-port ladder and lattice synthesis. Three-terminal RC network synthesis approximation in the frequency and time domains. Prerequisite: EE 113 or permission of instructor. (Fall 1974 and alternate falls—evening; fall 1975 and alternate falls—day)

216 **Linear Network Synthesis II (3)**

Advanced topics in passive one-port and two-port synthesis. Introduction to n-port synthesis. Active network synthesis using negative resistance, controlled sources, NIC, gyrator, operational amplifiers, and circulators. Synthesis of distributed integrated networks. Computer-aided network optimization. Prerequisite: EE 215. (Spring 1975 and alternate springs—evening; spring 1976 and alternate springs—day)

221 **Physical Electronics I (3)**

Theoretical principles underlying the operation of electronic devices; classical mechanics and classical statistical mechanics, the quantum theory, wave and matrix mechanics, quantum statistics. Prerequisite: graduate status. (Fall 1974 and alternate falls—day; fall 1975 and alternate falls—evening)

222 **Physical Electronics II (3)**

The Boltzmann transport equation, band theory of solids, time-dependent perturbation theory, group theory. Applications to semiconductor and other solid-state devices such as transistors, tunnel diodes, masers, and lasers. Prerequisite: EE 221. (Spring—day)

224 **Quantum Electronics of Masers and Lasers (3)**

Basic concepts from quantum mechanics; Einstein coefficients; inversion and pumping mechanisms; rate equations. Resonators, He-Ne laser; organic dye lasers; injection lasers. Nonlinear interactions in lasers. Prerequisite: EE 221 or equivalent. (Fall—evening)

225 **Nonlinear Electronics (3)**

Analysis and design of electronic components and systems operating as switching, sweeping, gating, and pulse generators; study of multivibrators, negative resistance devices and amplifiers, nonlinear operation of oscillators. Prerequisite: EE 122, CS or EE 153; or equivalent. (Fall 1974 and alternate falls—evening; fall 1975 and alternate falls—day)

226 **Optical Electronics (3)**

Principles of optical systems, aberrations, and optical resonators; quantum theory of radiation, coherence and detection of radiation; lasers, holography, optical (spatial) filtering, and nonlinear optics. Prerequisite: EE 230 or equivalent. (Spring 1975 and alternate springs—evening; spring 1976 and alternate springs—day)

227 **Industrial Electronics (3)**

Applications of electronic devices in industry; continuous and sampled control systems; induction and dielectric heating; timing and counting circuits; reliability and automatic checking equipment; digital control of machine tools. Prerequisite: EE 122 or equivalent and graduate status. (Fall—evening)

228 **High-frequency Electronics** (3)

Design and analysis of the operation of electron-tube, solid-state, crossed-field, space-charge wave, and quantum maser oscillators and amplifying devices that lay the foundation of modern-day communication systems. Prerequisite: EE 230 or equivalent. (Spring—evening)

229 **Precise Optical Measurements** (3)

Optical constants of lens systems; aberration; resolving power; illumination in focal plane; image evaluation, magnification, index of refraction, color and color temperature. Prerequisite: graduate status. (Fall—evening)

230 **Electromagnetic Theory** (3)

Brief review of Maxwell's equations, boundary conditions, electromagnetic potentials, Poynting's theorem, generalized orthogonal coordinates, field equivalence theorems; applications to problems involving reflection, refraction, scattering, and diffraction of electromagnetic waves. Prerequisite: EE 32. (Fall—evening)

231 **Field Analysis and Potential Theory** (3)

General study of the theory of potentials as used to facilitate solution of problems in electromagnetic theory, mechanics, thermodynamics, optics, and gravitation. Emphasis on mathematical methods such as Green's functions, variational methods, principal axis transformations, and multi-dimensional Fourier transforms. Prerequisite: EE 201; EE 133 or 230. (Fall 1974 and alternate falls—evening; fall 1975 and alternate falls—day)

232 **Electrodynamics** (3)

Special theory of relativity and the Lorentz transformation; Minkowski formulation. Maxwell's equation in the context of special relativity, electromagnetic potentials, and stress tensors. Lagrangian and Hamiltonian formulation, radiation from moving charges. Introduction to quantum electrodynamics. Prerequisite: EE 201, 230. (Spring 1975 and alternate springs—evening; spring 1976 and alternate springs—day)

233 **Microwaves and Components** (3)

High-frequency transmission lines and guided systems; matching techniques; scatter ferrite isolators, gyrators; Faraday rotation; microwave networks; directional couplers; cavity resonators and microwave components. Prerequisite: EE 230. (Fall—evening)

234 **Electromagnetic Wave Propagation** (3)

Retarded time scalar, vector, and Hertz potential. Dipole and dipole array fields; Mie theory of electromagnetic scattering by spheres. Propagation in electrically and magnetically anisotropic media such as dielectric crystals, space-charge plasmas, and ferrites. Wave propagation in inhomogeneous media; Liouville transformation. Lagrange's variation of parameters, WKB solution, invariant imbedding techniques. Propagation in stochastic and dispersive media. Prerequisite: EE 230. (Spring 1975 and alternate springs—day; spring 1976 and alternate springs—evening)

235 **Antennas** (3)

General solution of Maxwell's equations in terms of current sources, the far field approximations, radiation from current distributions, field equivalence theorems, the geometrical optics approximation, aperture antes

nas, receiving antennas, the theory of arrays, and applications to specific antennas and antenna types. Prerequisite: EE 230. (Fall 1974 and alternate falls—day; fall 1975 and alternate falls—evening)

236 Plasma Dynamics (3)

Study of the interaction of fluids with electromagnetic fields. Generalized Navier-Stokes and energy equations, magnetogasdynamic and magnetohydrodynamic approximations, boundary-layer theory, statistical theory of turbulance, generalized Von Karman-Howarth equation, Boltzmann transport equation. MHD generators and devices. Prerequisite: EE 230. (Spring—evening)

238 Precise Microwave Measurements (3)

Precise measurement of power, frequency, impedance, wavelength, and attentuation at microwave frequencies; characteristics and Q of resonant devices; calibration of microwave components; design of microwave experiments. Prerequisite: EE 230 or equivalent. (Spring—evening)

239 Precise Electrical Standards (3)

Concepts of standards, errors; design of resistance, capacitance and inductance standards; d-c voltage standards; frequency and time standards; dielectric and magnetic materials, attenuation standards, power standards, transfer standards. Prerequisite: EE 160 or equivalent. (Spring—evening)

241 Information Theory (3)

Measure of information, noiseless coding; communication channels, channel capacity, the noisy channel coding theorem; bounds on the performance of communication system; the Gaussian and binary symmetric channel; feedback communications systems; rate-distortion theory. Prerequisite: EE 204. (Fall 1974 and alternate falls—day; fall 1976 and alternate falls—evening)

242 Coding Theory (3)

Error-correcting codes; bounds on the performances of error-correcting codes, group codes; syndrome decoding; cyclic codes, their encoding and decoding; Galois fields; BCH codes, burst correction, and threshold-decodeable codes; performance calculations. (Spring 1975 and alternate springs—day; spring 1976 and alternate springs—evening)

243 Communication Theory I (3)

Optimum receivers for vector channels and for the additive white Gaussian noise channel; correlation detectors, matched filters; coherent and noncoherent detection and their error probabilities for simplex, orthogonal, and coded systems; bounds on the performance of communications in Gaussian noise; comparison of communications systems. Prerequisite: EE 204 or equivalent. (Fall 1974 and alternate falls—evening; fall 1975 and alternate falls—day)

244 Communication Theory II (3)

Schemes for efficient signaling for data sequences; effects of quantizing at the receiver; detection of such signals in colored noise; detection of stochastic signals; the innovations approach in detection and estimation problems; signaling over fading channels and the optimum receivers; diversity techniques and their performances. (Spring 1975 and alternate springs—evening; spring 1976 and alternate springs—day)

245 **Signal Detection and Estimation Theory** (3)

Statistical detection theory, hypothesis testing, sequential detection, estimation theory, maximum likelihood and Bayes methods, estimation of signal parameters and continuous wave forms, Wiener and Kalman filters, applications to the design of optimum receivers, adaptive systems. Prerequisite: EE 241, 244; or equivalent. (Fall—evening)

246 **Digital Communications** (3)

Bounds on the performance of data communications; channels with high dispersion; intersymbol interference and its minimization; Nyquist criteria, eye openings, tail cancellation techniques, correlative coding, transversal equalizers, adaptive equalizers; broadband, noise limited channel; orthogonal codes, simplex codes, bounds on error probability; reception by matched filters, "Green machine," and other techniques; convolutional codes; decoding by sequential decoding and Viterbi decoding; performance analysis. Prerequisite: EE 243 or equivalent. (Spring—evening)

247 **Communication Systems** (3)

Wiener filters, phase-locked loops and their optimization. Parameter estimation theory with application to optimum demodulation of analog wave forms (DSB-AM, SSB-AM, FM). Comparative analysis of analog modulation systems. Digital communication systems—coherent and noncoherent reception of binary and M-ary signals and their performance analysis. Frequency acquisition and synchronization. Prerequisite: EE 243. (Fall—evening)

248 **Microwave Communication Systems** (3)

Analysis and design of microwave communication systems with emphasis on radar, microwave relay, and satellite systems. Prerequisite: EE 143, 230. (Spring—evening)

249 **Data Telecommunication Networks** (3)

Techniques for the analysis and design of data networks with store, forward, and message switching capability, queuing theory, Erlang's formula, priority systems; optimization based on minimization of message delay, synchronous and asynchronous multiplexing; topological problems, graph theory, connectivity and survivable networks, probabilistic graphs; data networks with a central computer; terminal oriented systems. Prerequisite: EE 205 or equivalent.

*250 **Telecommunication Systems Concepts** (3)
(Formerly TCom 251)

Essential elements of an electrical communication system, speech, TV, and data signals; spectrum, bandwidth, sampling. Amplitude, frequency, and pulse code modulation and comparative performance. Multiplexing schemes, communication quality standards, and objectives. Signal power, noise power, distortion, and channel capacity. Probability, traffic theory, reliability, voice, TV, and data transmission. Telecommunication, microwave radio, cable, and satellite communications systems.

*251 **Survey of Telecommunication Systems** (3)
(Formerly TCom 250)

Design of a communications link for voice, TV, and data. Loading; the switched telephone network. Transmission system layout and major de-

* EE 250 and 251 cannot be applied toward a Master's or Doctor's degree in the School of Engineering and Applied Science.

sign considerations. Over-all system design of microwave radio system. Radiowave propagation fundamentals. Satellite communications, factors affecting the choice of orbit and orbital separation of satellites, satellite transponder. Major design consideration and values of significant parameters for a typical satellite communications link. Over-all design of a cable communication system. Digital transmission and terminals. Wideband data transmission. Frequency allocation.

252 **Digital Signal Processing Techniques** (3)

Digital signal processing and data reduction techniques; applications to communications, controls, image enhancement, radar, and speech processing. Least-squares fitting of polynomials; sampling and quantization. Recursive and nonrecursive digital filter design. Generation and shaping of pseudo-random noise. Estimation of correlation functions and spectral densities. Digital processing for Kalman Bucy filters. Extraction of signals and timing from noise. Fast Fourier and Hadamard transforms. Software and hardware implementation of signal processing algorithms. Prerequisite: Ap S 115, EE 51; or equivalent; and graduate status. (Fall)

255 **Optical Processing** (3)

Fourier transforms by diffraction of light, optical spectrum analysis, optical memories and systems, holography and holographic techniques, properties and techniques for photographic reproduction. Prerequisite: EE 201. (Fall—evening)

256 **Environmental Optics** (3)

Distribution of radiation: power converting and transferring systems; UV, luminous, IR spectral sources; daylight; moonlight; luminaries. Environmental boundaries—transmission, reflection, diffusion, refraction, diffraction, dispersion, bleaching, phototropy, polarization. Simulation of organismic responses: response definition—physiological, overt behavioral, perceptual, cognitive. Stimulus-response correlation model; correlating measurement concepts. (Fall—evening)

272 **Discrete Systems** (3)

Sampling processes and theorems; Z-transforms and modified Z-transforms; responses of discrete systems using transformation techniques and state equations; stability criteria; design of digital controller for discrete systems. Prerequisite: EE 203 or equivalent. (Spring—evening)

273 **System Optimization** (3)

Parameter optimization problems; theory of minima and maxima. Optimization problems for dynamic systems; calculus of variations; the maximum principle and the Hamilton-Jacobi equation. Optimization problems with constraints; optimal feedback systems. Numerical solution of optimal problems. Prerequisite: EE 202 or equivalent. (Fall—evening)

274 **Nonlinear Systems** (3)

Definition of linear and nonlinear systems; introduction to approximate analysis of nonlinear systems—describing functions, Krylov and Bogoliubov's asymptotical method and Tsypkin's locus. Forced oscillations—jump resonance. Stability analysis—Liapunov's criterion, Luré's problem, and Popov's method. Prerequisite: EE 203. (Spring—evening)

275 **System Identification and Adaptive Systems** (3)

Introduction to the adaptive problem and practical applications. Determining the mathematical representation of systems—the identification

problem. Optimal estimation of states in the presence of uncertainties. Adaptive systems. Prerequisite: EE 202, 204; or equivalent. (Fall—evening)

276 **Cybernetics** (3)

Principles of machines or mechanisms made by men or nature with regard to their ways and forms of possible behaviors: regular, determinate, or reproducible; fundamental concepts of finite differences; changes and transformations as sets of transitions, leading to stability and feedback; statistical concepts of complex systems and blackbox theory; Shannon's information theory; regulation and control of mechanisms. Prerequisite: graduate status and Ap S 115 or equivalent. (Spring—evening)

277 **Space Communication Systems** (3)

Theoretical and application aspects of space communications, as related to communication satellite systems, scientific satellites, manned space missions, and deep space missions. Prerequisite: graduate status. (Fall—evening)

278 **Spacecraft Systems Design** (3)

Space environment; structure, propulsion, control, and instrumentation of spacecraft—launch, orbit, transit, and re-entry problems; bioastronautic considerations. Prerequisite: graduate status. (Spring—evening)

281 **Medical Instrumentation I** (3)

Theory of measurements in biological areas, techniques for electronic measurements on biological specimens, current problems in medical metrology stressing electronic systems. Prerequisite: EE 283 or permission of instructor. (Fall—evening)

282 **Medical Instrumentation II** (3)

Medical telemetry systems, medical use of the computer, engineering techniques in patient treatment, principles of good medical instrumentation. Prerequisite: EE 283 or permission of instructor. (Spring—evening)

283 **Introduction to Medicine for Engineers I: Physiology and Anatomy** (3)

Designed to acquaint the engineering student with the physiology of the human body; material based on the curriculum of the School of Medicine and taught from a systems viewpoint; concepts of cellular structure and function integrated into the tissue and organs, which are then related to the various systems of the body; interrelationships of the body systems, i.e., the interaction of the nervous system with the musculoskeletal system or the interaction of the respiratory system and its functions with the cardiovascular system. (Fall—day)

284 **Introduction to Medicine for Engineers II: Clinical Medicine** (3)

Clinical aspects of medicine. Further elaboration of physiological systems, such as the endocrine system, renal physiology, gastrointestinal physiology, and others; the separate systems of the body are integrated to present the functioning of the body as an over-all system; considerable interaction with physicians and other medical personnel. Prerequisite: EE 283. (Spring—day)

285 **Engineering in Physical Medicine and Rehabilitation** (3)

Application of engineering theory and techniques to the rehabilitation of handicapped persons; major problem areas and general approaches, as well

as specific solutions. Offered cooperatively with personnel from the Social and Rehabilitation Services Administration. Prerequisite: EE 284. (Spring—evening)

286 **Sensory Evoked Potentials** (3)

Physiological significance of the sensory evoked potential, stimulation variables, subject variables, data acquisiton procedures and instrumentation, signal-averaging computers, analysis techniques for the VEP, applications of the VEP. Lectures, discussion, and laboratory. Prerequisite: EE 281, 282, 283, 284; or permission of instructor.

287 **Computer-aided Analysis of Physiological Signals** (3)

Computer analysis of physiological data obtained from the cardiovascular, pulmonary, and nervous systems. Sources and detection of various signals obtained from these systems; algorithmic techniques applicable to the analysis of these signals; students provided with real data, obtained from hospital patients, and required to develop computer software for determining pertinent medical parameters as established by physicians. Prerequisite: EE 281, 282, 283, 284; and a working knowledge of FORTRAN.

288 **Physiological Controls and Systems** (3)

Some applications of control and systems theory in the medical and biological fields. Application of general control and systems theory as applied to physiological systems. Specific applications of control and systems theory to the visual system, respiratory system, cardiovascular system, and musculoskeletal system. Prerequisite: EE 172 or equivalent; EE 281, 282, 283, 284.

298 **Research** (arr.)

Research as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

319 **Networks Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

323 **Principles of Microelectronics** (3)

Basic principles, techniques, and processes necessary for understanding microelectronics. Semiconductor physics, phase diagrams, crystal growth, epitaxy, vacuum techniques, thin-film deposition, diffusion, oxidation, junction formation, masking, and properties of thin films and materials. Prerequisite: EE 222 or equivalent.

329 **Electronics Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

339 **Fields and Waves Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

349 **Communications Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

371 **Simulation Methods for System Analysis** (3)

Survey of simulation languages. Techniques of model building for material- and machine-based systems. Treatment of these systems with notion of transactions and states. Modeling the dynamic processes of growth problems. Analog, hybrid, and digital methods for simulation treated by means of case studies; speed and cost of alternate computing procedures. Project-type problems used to illustrate simulation methods. Prerequisite: CS 278 or permission of instructor. (Fall—evening)

372 **Analysis and Control of Large Systems** (3)

Systems as multistage decision processes. Analytical concepts of model-making and matrix representations of large systems. Approximation by models of lower dimension—reduction to simplified models; decentralized systems. Differential games; computation of saddle points; construction of an equilibrium point. (Spring—evening)

379 **Controls and Systems Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

389 **Medical Engineering Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

COMPUTER SCIENCE COURSES

201 **Introduction to Computer Systems I** (3)

Introduction to programming digital computers in a macro-assembly language and higher-level procedural languages; techniques in machine control and memory addressing. Characteristics of different computer structures and the programming of such machines. Introduction to the structure of compiler languages; parsing of compiler language statements. Characteristics and choice of data processing languages. Prerequisite: CS or EE 51 or equivalent; or permission of instructor. (Fall and spring—evening)

202 **Introduction to Computer Systems II** (3)

Introduction to combinational and sequential logic networks; analysis and synthesis of switching circuits using Boolean algebra; minimization techniques in the design of logical circuits; number systems and arithmetic in digital computers, digital computer architecture and the design of functional sub-units; design of memory, arithmetic, and units comprising a digital computer; information flow, timing, and control in large digital computers. Prerequisite: CS 201 or permission of instructor. (Spring—evening)

214 **Data Structures** (3)

Introduction to discrete structures. Computer data structures; arrays, items, pointers, lists, insertion and deletion, available space management, threaded lists, two-way lists, garbage collection and compactification. Pushdown stacks, strings, and files. Trees and hash table searching.

bubble, radix and merge sorting. Sequential, indexed sequential, and random files; access methods; sorting of files. Subroutines, co-routines, macros, flags, relocation and recursion. Buffer and buffer management, data management and storage. List and string processing languages. Prerequisite: CS 201, or CS or EE 157. (Spring—evening)

215 **Computer Graphics and Pattern Recognition** (3)

Graphical data processing and display systems; software systems needed for graphical I/0; digital and analog display methods; scanning, sampling, digitizing, and transmission of data; concept analysis; linear and area transforms; geometry, topology, and syntax of pictures; resolution analysis; signal-to-noise problems; transformations, projections, and the hidden-line problems. Prerequisite: CS 214, or CS or EE 158; or permission of instructor. (Fall—evening)

216 **Information Retrieval Systems** (3)

Information organization and retrieval of natural language data by digital computer systems; statistical, syntactic, and logical analysis of natural language used for retrieval systems; dictionary systems including thesaurus look-up and phrase structures; searching strategies and cataloguing. Input preparation and output structures; large-scale file structures and operating systems required for their use. Prerequisite: CS 214, or CS or EE 158; or permission of instructor. (Spring—evening)

223 **Simulation and Heuristics** (3)

Techniques of deterministic and probabilistic simulation on the digital computer. Mathematics for simulation; design of systems modules; random number generation and testing. Markovian and bounded context systems; generation of stochastic variates; Monte Carlo techniques; heuristics; verification techniques; simulation langauges. Prerequisite: CS 201, or CS or EE 157, and permission of instructor. (Spring—evening)

231 **Finite State Machines** (3)

Analysis and design of sequential networks, state diagrams, flow table, equivalence of states, races, transition maps, output tables, hazards, synchronous and asynchronous sequential networks. State assignment problem, partitions, partition pairs, information flow inequalities, clocks, state realizations, parallel and serial decompositions, machine networks and decompositions. State identification. Prerequisite: CS 202, or CS or EE 153. (Fall—evening)

232 **Finite Automata** (3)

Effectively computable functions, recursive functions, regular expressions, single- and multiple-tape Turing machines, probabilistic automata, neural nets, reliability of automata, artificial intelligence, learning machines, threshold logic, adaptability, pushdown automata. Prerequisite: CS 202, or CS or EE 154, and CS 231. (Spring—evening)

237 **Computing Systems** (3)

Organization of large digital computer systems. Design of high-speed arithmetic units. Random access and associative memories; rotational storage devices; computer control and interrupt structures. Input-output channels and interfacing problems. Communications in digital computers. Introduction to multiple access and time-sharing systems. Prerequisite: CS or EE 154. (Fall 1974 and alternate falls—evening; fall 1975 and alternate falls—day)

238 **Advanced Computing Systems** (3)

Multiple access computer systems, multiprogramming, multiprocessing, and time-sharing. Real-time computation; man-machine communication problems, and remote I/O devices. Memory allocation and protection. Secondary storage organization and retrieval. Effects of storage on program operation. Design of file structures. Analytical time-sharing models, scheduling schemes, and user response time. Prerequisite: CS 237. (Spring—evening)

239 **Comparative Computer Systems** (3)

Structures of computers and a general language for system description. History of different computer structures. Development of the operating system. Special purpose processors. Multiprocessors and large computing systems. Computer networks and time-shared systems. Comparison of computer families. Characteristics and philosophies of computer design of the major manufacturers. Introduction to performance evaluation and measurement. Effects of software and technology on computer structures. Prerequisite: CS 237, 263. (Fall—evening)

240 **Theory and Practice of Microprogramming** (3)

Basic concepts, techniques, and theory of microprogramming as applied to the implementation of control systems for sequential machines. Microprogramming languages, assemblers, and hardware simulators, including specific applications of these to the design of current computer systems and their interfaces with real-time systems. Prerequisite: CS 237, 263. (Spring—evening)

263 **Digital Computer Programming Systems** (3)

Introduction to the design of computer software and software systems. Design of assemblers and monitor systems. Communication between components of systems. Design of loaders, input-output control systems, and utility systems. Prerequisite: CS 214, or CS or EE 158; or permission of instructor. (Fall 1974 and alternate falls—day; fall 1975 and alternate falls—evening)

264 **Design of Compilers and High-level Languages** (3)

Design of high-level, procedural-oriented languages. Theory of formal languages and their grammars. Parsing the language. Syntax of the language and its recognizers. Semantics and pragmatics as they affect the design of translators and compilers; correctness of programs; context-free languages; top-down and bottom-up recognizers. Tables and their organization in compilers; optimizing compilers and production of machine code. Prerequisite: CS 214, or CS or EE 158; or permission of instructor. (Spring 1975 and alternate springs—day; fall 1975 and alternate falls—evening)

267 **Operating Systems I** (3)

Introduction to the operating system for batch-operated multiprogrammed computer systems. Software components which constitute the operating system. Facilities of the macro-assembler which utilize the operating system; loading and linking routines; initializing programs and tasks; dispatching and the interrupt mechanisms. Memory management in fixed and variable partitions; device and storage management. Input-output control and use of access methods. Performance evaluation of a multiprogrammed batch-operated system. Prerequisite: CS 263. (Fall—evening)

268 **Operating Systems II** (3)
Introduction to operating systems for time-shared and multiprocessor computer systems. Processor management in a multiprocessor system; deadlocks, processor utilization, and I/0 management. System availability and fail-soft mechanisms. Time-slicing and time-sharing operating systems and subsystems; transaction processing subsystems; memory management in a paged and segmented virtual memory system. Performance of the operating system. Computer network software and an introduction to the computer as a utility. System security and large data base systems. Prerequisite: CS 267. (Spring—evening)

278 **Analog and Hybrid Computers** (3)
Analog computer components and electronics. Slow analog computer solutions of linear and nonlinear differential equations. System simulation and modeling on the analog computer. Introduction to the iterative analog computer. Transfer function simulation and use in control theory. The hybrid computer, digital logic and digital computer control. Digital-to-analog and analog-to-digital converters and interfaces. Optimization methods on a hybrid computer. Parameter variations and searching methods. Prerequisite or concurrent registration: CS 202, or CS or EE 154; or permission of instructor. (Spring 1975 and alternate springs—evening; spring 1976 and alternate springs—day)

284 **Applications of Numerical Methods** (3)
Numerical methods in scientific and engineering problems; development of computer algorithms for the solution of numerical problems; error analysis and sensitivities of numerical methods; use of a procedural computer language in the solution of numerical methods; computer methods for simultaneous equations, interpolation, differentiation and quadrature, solution of ordinary differential equations, boundary-value problems, partial differential equations, and linear algebra. Prerequisite: CS or EE 51 or equivalent and permission of instructor. (Spring—evening)

*285 **Approximation of Functions and Data Representations** (3)
Review of linear spaces; least squares, orthogonal functions; nonlinear techniques, gradient search methods; parameter estimation with discrete data; Tchebysheff approximation; approximation and curve fitting by Spline functions and Bernstein polynomials.

298 **Research** (arr.)
Research as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

391 **Computer Science Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

*Offered at NASA-Langley Research Center; may be offered on campus when arranged.





Engineering Administration

Engineering Administration

Professors P.A. Crafton *(Chairman)*, H.E. Smith, P.S. Shane, John Kaye
Professorial Lecturers D.P. Boyd, B.B. Bright, G.M. Coburn
Associate Professor J.B. Smith, Jr.
Associate Professorial Lecturers L.S. Rotolo, R.L. Bangert, M.J. Seidel, Vladimir Hamza
Assistant Professorial Lecturers R.W. Stroup, Richard Sears, J.E. Just, R.K. Trehan

GRADUATE FIELDS AND AREAS OF CONCENTRATION

Administration of Research and Development
Construction Management
Engineering Administration
Environmental Management
Management Information Systems
Marketing of Technology
Systems Analysis
Technology and Public Affairs
Transportation Management

Programs in Engineering Administration lead to the degrees of Master of Engineering Administration and Doctor of Science. Programs in Administration of Research and Development, Construction Management, Environmental Management, Management Information Systems, Marketing of Technology, Technology and Public Affairs, and Transportation Management lead to the degree of Master of Engineering Administration. Programs in Systems Analysis lead to the degrees of Master of Science and Doctor of Science.

THE MASTER OF ENGINEERING ADMINISTRATION DEGREE PROGRAM

The principal objective of the program leading to the degree of Master of Engineering Administration is to prepare students whose undergraduate background training was in engineering, mathematics, or science for positions of managerial responsibility in technological and scientific organizations, in industry, government, or the armed services.

The program is designed to help the student achieve a broad understanding of the administrative process. Although years of experience are required to develop the skills, insight, and maturity of judgment which distinguish an effective manager in technological and scientific organizations, a graduate professional management curriculum can give the student an effective start as a manager. The curriculum provides an opportunity for the student to gain an understanding and to develop some useful managerial skills in the functional areas of engineering administration. One of the major purposes is to assist the student in forming the habit of examining problems from an over-all administrative point of view. The individual's own particular experience, and the explicit process of relating this experience to the theoretical structure which he starts to build in graduate study, provides each student with a personal frame of reference through which he may interpret management in a rapidly changing world.

Successful education for engineering administration implies a clear statement of what it is that an engineering manager must do, an analysis of the broad functions involved in management, and a detailing of modern methods useful in making and executing decisions in the management of technological and

scientific organizations. It is the aim of the School, therefore, to keep alive a spirit of general inquiry and a problem-solving orientation.

The management of technological organizations is one of the most difficult challenges of our times. The professional engineering manager today must understand not only the currently developing technologies but also the rapidly changing marketplace where these technologies are applied for society's benefit. The engineering administrator is the link between these dynamic technologies and the needs of society in general.

In summary, the program of study has for its objective an educational experience which will contribute to the development of managers possessing a combination of technical know-how and administrative skill.

ADMISSION

In addition to the requirements for admission to graduate study (see pages 22–23) applicants for programs leading to the degree of Master of Engineering Administration are required to meet the following requirements: (1) the applicant must have an adequate knowledge of the principles of human relations, the fundamentals of engineering economic analysis, and the fundamentals of quantitative methods. This requirement can be met by satisfactory completion of the following undergraduate courses or approved equivalents: E Ad 150, *Introduction to Technical Management;* E Ad 160, *Introduction to Engineering Economic Analysis;* and E Ad 170, *Basic Quantitative Methods for Engineering Administration.* (2) The applicant may be required to complete other undergraduate prerequisite courses prescribed as a condition of admission. (3) A student is required to earn the grade of *C* or better (unless the requirement is stipulated to be a grade of *B* or better upon his admission) in each undergraduate prerequisite course. If this scholarship requirement is not met the student is barred from further enrollment. A student is not permitted to repeat any of the undergraduate prerequisite courses. Credit for prerequisite courses is not applicable toward the degree of Master of Engineering Administration, and all prerequisite courses must be completed prior to taking graduate courses in this degree program.

ADMINISTRATION OF RESEARCH AND DEVELOPMENT

The objective of the program of study in the field of Administration of Research and Development is to prepare students for responsible managerial positions in organizations conducting technological or scientific research and development and in organizations planning and administering programs of technological or scientific research and development.

REQUIRED COURSES

A program of study consisting of a sequence of courses is prescribed for each student in conference with an adviser. Students are required to complete E Ad 211–12*, 255, 269*, 295, and 299–300 (for those electing the thesis program) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration.

*E Ad 211–12 and 269 must be taken at the beginning of the program of study.

CONSTRUCTION MANAGEMENT

Construction Management encompasses those managerial functions in an organization that plans and executes major construction work. This can take place in the field, in the project office, or in a main office. Due to the inherent complexity of present-day engineering, engineers need to know management as well as basic planning, design, and construction methods. They need to know construction developments, problems of contracts and specifications, techniques of scheduling and control, estimating, labor relations, and industrial or management psychology.

The objective of the program of study in the field of Construction Management is to prepare the engineer for the task of marshalling men, materials, machines, and money against time, cost, weather, and human nature to plan and build structures.

REQUIRED COURSES

Students are required to complete E Ad 211–12*, 241, 242, 269*, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected, with the approval of the student's adviser, from courses in the Department of Engineering Administration, the Department of Civil, Mechanical, and Environmental Engineering, and other departments of the University.

ENGINEERING ADMINISTRATION

Study in engineering administration provides the conceptual depth in management practice and knowledge needed by technical and scientific personnel who are confronted with increasing demands and mounting complexities. Technical knowledge is complemented by an understanding of theory and practice in management action. Engineering management is a logical development of a technological society. The program of study is designed to provide engineers with a knowledge of and proficiency in the administration of engineering and science. It emphasizes use of deliberative, purposive study of general administrative problems and opportunities, as well as the study and use of specific knowledge and methods needed to solve administrative problems and to explore opportunities.

REQUIRED COURSES

Analysis, case study, and quantitative approaches are emphasized in addition to technical reviews of administration. A program of study consisting of an integrated sequence of courses is prescribed for each student in conference with an adviser. Students are required to complete E Ad 211–12*, 269*, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is elective. E Ad 211–12 and 269 must be taken prior to the elective courses, except that in certain cases permission may be obtained for concurrent registration. Electives are chosen from the Department of Engineering Administration and other departments of the University, but no more than two courses may be chosen from other departments.

* E Ad 211–12 and 269 must be taken at the beginning of the program of study.

ENVIRONMENTAL MANAGEMENT

The objective of the program of study in the field of Environmental Management is to prepare students for responsible managerial positions in organizations conducting environmental control and in organizations planning and administering programs in the prevention and control of environmental pollution.

REQUIRED COURSES

Students are required to complete E Ad 211–12*, 221–22, 261, 269*, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected, with the approval of the student's adviser, from appropriate courses in the Department of Engineering Administration, the Department of Civil, Mechanical, and Environmental Engineering, and other departments of the University.

MANAGEMENT INFORMATION SYSTEMS

The objective of the program of study in the field of Management Information Systems is to provide the developing manager in technological and scientific organizations with the understanding and competence in the managerial use of systems that furnish quickly to management information in the variety of forms that are required for day-to-day operations and long-range decisions.

REQUIRED COURSES

Students are required to complete E Ad 211–12*, 269*, 295, 321, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration, and, with the approval of the student's adviser, in other departments of the University.

MARKETING OF TECHNOLOGY

As the American economy matures and American citizens survey the broad spectrum of options available to them, it is apparent that scientific and engineering outputs must be sold in world-wide competition both at home and abroad. The trained specialist is becoming more important than ever before in performing the selling function.

The objective of the program of study in the field of Marketing of Technology is to prepare students for responsible positions in marketing technical products and services.

REQUIRED COURSES

Students are required to complete E Ad 211–12*, 269*, 293, 294, 311, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration.

*E Ad 211–12 and 269 must be taken at the beginning of the program of study.

TECHNOLOGY AND PUBLIC AFFAIRS

The objective of the program of study in the field of Technology and Public Affairs is to prepare students for responsible positions requiring managerial decision-making on matters that involve the impact of technology on public policy and that concern the general interrelationship between modern technology and public affairs.

REQUIRED COURSES

Students are required to complete E Ad 211–12*, 269*, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected, with the approval of the student's adviser, from courses in the Department of Engineering Administration, the National Law Center, and other departments of the University.

TRANSPORTATION MANAGEMENT

The objective of the program of study in the field of Transportation Management is to prepare students for responsible positions in the management of transportation systems or the formulation of transportation policy.

REQUIRED COURSES

Students are required to complete E Ad 211–12*, 265, 266, 269*, and 299–300 (for those electing a thesis) or 297 (for those not electing a thesis); the remainder of the program is selected from courses in the Department of Engineering Administration, and with the approval of the student's adviser, in other departments of the University.

THE MASTER OF SCIENCE DEGREE PROGRAM

SYSTEMS ANALYSIS

The program of study in the field of Systems Analysis leads to the degree of Master of Science and is administered by the Department of Engineering Administration.

The objective of this program is to prepare students whose undergraduate background training was in engineering, mathematics, or science for responsible positions in the practice of systems analysis.

ADMISSION

The admission requirement for the Master of Science degree in the field of Systems Analysis is a Bachelor's degree in engineering, mathematics, or the sciences from a recognized institution. An applicant may be required to complete undergraduate prerequisite courses prescribed as a condition of admission. Such courses are not applicable toward the Master of Science degree and must be completed prior to taking any graduate courses in this program.

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* E Ad 211–12 and 269 must be taken at the beginning of the program of study.

REQUIRED COURSES

Students are required to complete E Ad 281, 282, 283, 284, and 299–300 (equivalent to 6 semester hours for those electing a thesis) or 9 semester hours of approved courses (of which one must be E Ad 297) in lieu of E Ad 299–300. The remainder of the program is selected, with the approval of the student's adviser, from courses in the Department of Engineering Administration and other departments of the University.

E Ad 281, 282, 283, and 284 must be taken prior to any other courses in this program of study.

DOCTORAL STUDY

Programs in Engineering Administration and in Systems Analysis leading to the degree of Doctor of Science provide advanced study and research to enable gifted students to extend their fields of knowledge and to enhance their career opportunities in research or education.

ADMISSION TO DOCTORAL STUDY

All applicants must meet the general requirements for admission to doctoral study stated on pages 26–27.

Applicants for doctoral study in Engineering Administration must have a Master's degree, with a superior record of academic achievement in Engineering Administration or a related field. Applicants for study in Systems Analysis must have a Master's degree, with a superior record of academic achievement in Systems Analysis or a related field.

As part of the admissions condition for doctoral study (1) in Engineering Administration, superior performance on the comprehensive examination for the degree of Master of Engineering Administration, or (2) in Systems Analysis, superior performance on the comprehensive examination for the degree of Master of Science (Systems Analysis), is required before final approval of the course work for the doctoral program is granted. The examinations must be taken no later than the first semester of doctoral study. Outstanding professional performance is also considered in evaluating all doctoral applicants.

PROGRAMS OF STUDY

Major fields leading to the degree of Doctor of Science are available in both Engineering Administration and Systems Analysis. In addition to the major field, two minor areas of concentration are normally required, which may be chosen from the areas administered by this Department or from appropriate areas available in other departments of the University. The general requirements for doctoral study are stated on pages 27–30.

COURSES

UNDERGRADUATE

150 Introduction to Technical Management (3)

The interrelationships of engineering, science, and management; conceptual

foundations for interaction of human factors in individuals, groups, and the social environment of engineering activities. Familiarization with typical activities of engineering managers and with factors bearing on the motivation of engineers and on engineers as managers. Social and organizational factors relevant to the management of engineers. This course is preliminary to the complete management process studied in E Ad 211–12.

160 **Introduction to Engineering Economic Analysis** (3)

Influence of the time element: interest rates, equivalence, present worth, annual cost, internal rate of return. Incremental analysis. Data for analysis. Characteristics of an accounting system: balance sheet, profit and loss statement, depreciation, allocation of fixed costs, financial statement analysis.

170 **Basic Quantitative Methods for Engineering Administration** (3)

An introductory treatment of quantitative tools and techniques important in engineering administration, with emphasis on their application. Concepts of probability and decision-making in administrative decisions. (Fall and spring)

GRADUATE

201 **Management for Engineers and Scientists** (3)

Basic principles of engineering administration; management functions of planning, organizing, directing, and controlling; emphasis on industrial, scientific, and engineering environments. Open to students in programs outside the Department of Engineering Administration and open to candidates for the Master of Science degree in the School of Engineering and Applied Science. May not be taken by candidates for the degree of Master of Engineering Administration or for the degree of Doctor of Science with a major field in Engineering Administration. Open to advanced undergraduate students with permission of instructor. Students who receive credit for E Ad 201 cannot receive credit for E Ad 211–12.

204 **Administration of Engineering Contracts** (3)

Study of the total contracting process, including initial budget preparation and justification, actions leading to the execution of a contract, and administration of the contract to completion; considered from the viewpoints of the industrial and government buyer and the seller of technical materials and services. (Fall and spring)

207 **The Personnel Function for Engineering Administrators** (3)

Principles of managing human talent, the most vital resource in engineering or research; emphasis on principles, theory, and practical considerations of the personnel function for engineering managers, with practical applications in an engineering administration environment. (Fall and spring)

210 **Engineering Law** (3)

Legal principles and procedures of interest to engineers, the American legal system, contracts and specifications, liability of professional engineers, antitrust problems, agency relationships, negotiable instruments, patent and proprietary rights, special problems in research and development contracts. (Fall and spring)

211–12 **Engineering Administration** (3–3)

Comprehensive and systematic study of the administrative process; industrial, scientific, and engineering environments. Planning: objectives, prediction, policies, plans and characteristics of plans. Organizing: theory of organization, structure, authority, specialization, delegation, staff and committees. Directing: leadership, managing human and material resources. Controlling: setting standards, evaluating performance, using system feedback data for correction and improvement. Students who receive credit for E Ad 211–12 cannot receive credit for E Ad 201. (E Ad 211 and 212—fall and spring)

213 **Case Analysis in Engineering Administration** (3)

Written analysis and class discussion of cases involving application of the principles of engineering administration and use of the scientific method. (Fall 1974 and alternate falls)

221–22 **Environmental Management** (3–3)

Integration of social, technical, economic, and political forces which shape environment; review of government programs to combat air, water, solid waste, noise, and thermal pollution; conducting and analyzing a regional ecology system; legal aspects of environmental management; economic and technological impacts of environmental policies; effects of chemicals on ecology. Systematic waste management; social, political, and economic reactions to environmental policies. (Academic year)

231 **Program Management** (3)

Management science, the systems approach and traditional managerial concepts as applied to government and industry activities under program managers. Computer simulation of the management of a project to develop an earth satellite to the point of launch (GREMEX), with student participation. (Spring)

241 **Construction Management I** (3)

Contract negotiations; aspects of contracts and specifications important to management. Construction estimating and cost allocation in heavy and building construction; budgeting and accounting concepts. (Fall)

242 **Construction Management II** (3)

Construction administration: organization, construction planning, and scheduling. Industrial relations and human factors in construction management, work measurement, programming and progressing, project management and control. (Spring)

243 **Construction Management III** (3)

Managerial problems associated with advanced methods of construction and equipment; trend of mechanization; equipment policy and depreciation.

253 **Production Management** (3)

Planning, organizing, and control of production; forecasting techniques; material management; methods of loading and scheduling production processes; electronic methods in production control. Organization and administration of the plant engineering function with emphasis on maintenance control programs. Prerequisite: E Ad 269 or permission of instructor. (Spring)

254 Automatic Data Processing Systems (3)

Logic of computers, arithmetic and control units, systems analysis for da processing applications, systems design, systems economics, relation scientific decision processes. (Fall and spring)

255 Administration of Research and Development (3)

Study of contemporary practices of administrators of scientific and eng neering research and development; the relation of these studies to a cepted managerial concepts, and their effect on contemporary manageri hierarchies and organizational structures. (Fall and spring)

261 Economic Analysis in Engineering Planning (3)

Important concepts and theories employed in economic analysis of eng neering projects. Application of various analytical processes. Detailed practice in pursuit of solutions to, and adjustment of, persistent and cur rent problems in this field. Prerequisite: E Ad 269 or permission of in structor. (Fall and spring)

265 Transportation Management I (3)

Integration of social, technical, economic, and political considerations which shape transportation systems and their management. Review of local, state, and federal government programs in transportation. Conduct ing a management study of a local, regional, or national system.

266 Transportation Management II (3)

Legal aspects of transportation systems and their management.

269 Elements of Decision-making and Problem-solving (3)

History and orientation of quantitative methods; concept of quantitative decision-making; decision criteria under certainty, risk, and uncertainty; game theory; utility; the time factor; replacement models. Prerequisite: E Ad 170 or equivalent. (Fall and spring)

281–82 Systems Analysis and Management (3–3)

Systems analysis as applied to management, especially the planning func tion. Properties, nature, structure, and organization of systems; concep tualization of the total system. Operational functioning and description of systems. Objectives, alternatives, models, criteria, and feedback as analytical considerations. Enterprises, input-output structure of the U.S. economy and organizations from the systems point of view. Case analyses. (Academic year)

283 Systems Engineering I (3)

Concept of system structure and organization. Linear and nonlinear sys tems analysis; dynamics and stability of systems. Introduction to opti mization methods. (Fall)

284 Systems Engineering II (3)

Design of systems; simulation and modeling of systems; adaptive systems; system optimization. (Spring)

285 Seminar: Administrative Problems (3)

Individual analysis of complex administrative problems, with group evalu ation and discussion. Prerequisite: 18 semester hours of graduate credit. (Fall and spring)

293 **Technical Enterprises** (3)

Essential features of technology-based companies; basic issues of planning, organizing, financing, and managing a new venture from the entrepreneur's point of view; case studies and a detailed plan for a venture. Designed for those within technical firms and those within government who depend on technical firms as suppliers. (Fall)

294 **Marketing of Technology I** (3)

Marketing of industrial goods and high-technology projects; emphasis on the federal government as the customer. Products, channels, organization, selling, technical service, and control; case analyses. (Spring)

295 **Management of Technical Information** (3)

Needs and objectives of technical information systems, functions involved in technical information, storage and retrieval, abstracting, computer usage in technical information systems, system organization. (Spring)

297 **Problems in Engineering Administration** (3)

Project course providing the student with the opportunity to apply the various concepts and tools previously studied to the solution of a problem in engineering administration. Students work individually or in small groups, each on a problem proposed by the student and approved by the instructor. (Fall and spring)

298 **Research** (arr.)

Basic or applied research in engineering administration or systems analysis. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

311 **Marketing of Technology II** (3)

Continuation of E Ad 294. Special attention to marketing research, negotiation, and international marketing. Required for Master's degree candidates in the Marketing of Technology program. Prerequisite: E Ad 294. (Fall 1974 and alternate falls)

321 **Management Information Systems** (3)

Study and development of information systems used by middle and higher management of technological and scientific organizations in the control of many facets of the organization at all managerial levels. Required for Master's degree candidates in the Management Information Systems program. (Fall 1975 and alternate falls)

386 **Advanced Topics in Management** (3)

Reading and discussion of classic and important recent literature concerning the philosophy and application of management principles. (Fall 1975 and alternate falls)

387 **Technological Forecasting** (3)

Concepts and methodology: normative and exploratory forecasting, resource allocation and forecasting, technology transfer, technological change and its effects on forecasting, technology assessment. (Spring 1976 and alternate springs)

388 Cost Effectiveness (3)

Concepts of evaluation of engineered systems, current methods and trends in methodology, system resource requirements, probability and decision theory in cost effectiveness studies, systems approach to cost effectiveness studies. (Spring 1975 and alternate springs)

398 Advanced Reading and Research (arr.)

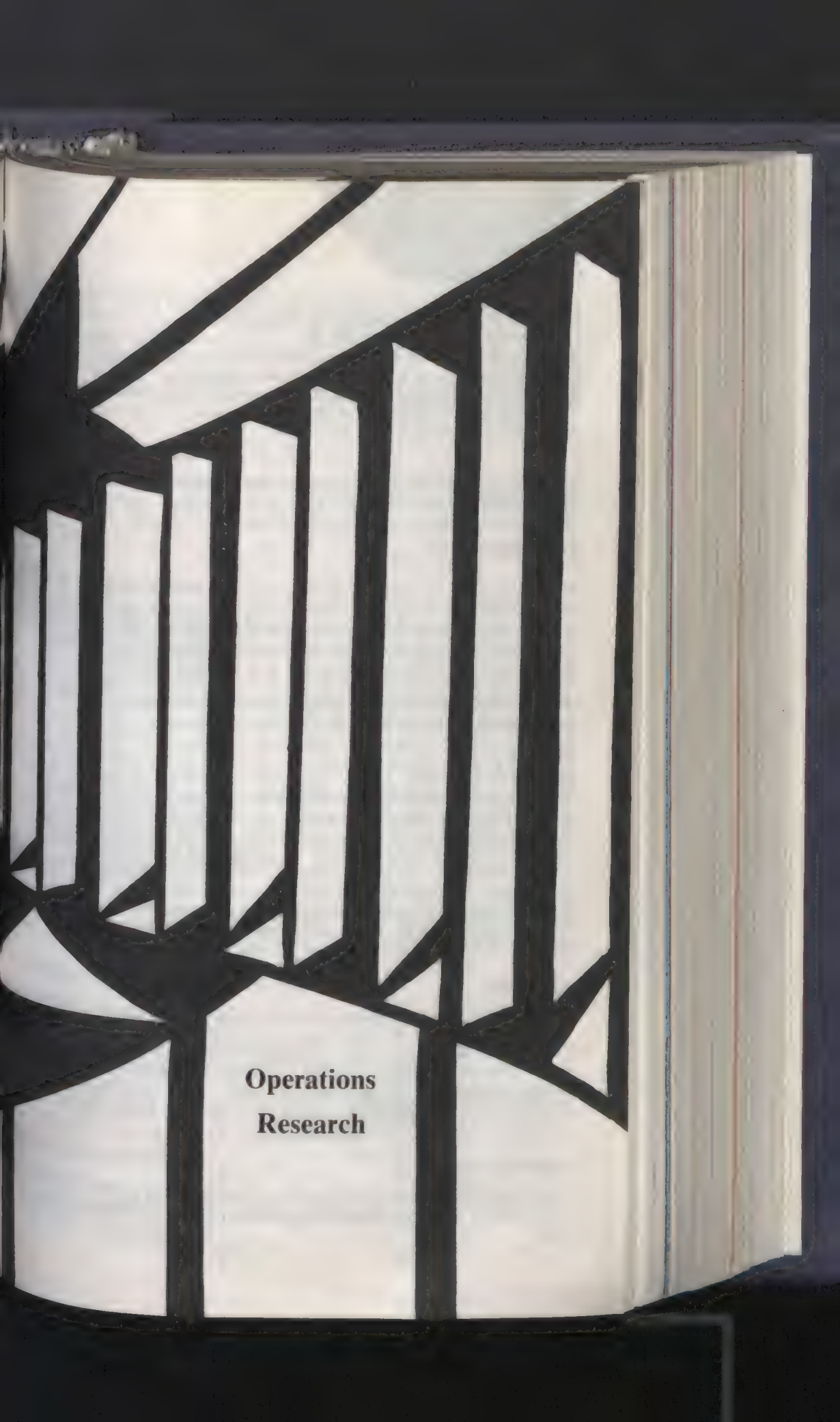
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)


BULLETINS
MAP OF CAMPUS




Operations
Research

Operations Research

Professors W.H. Marlow *(Chairman)*, Donald Gross
Professorial Lecturer Byron Cosby, Jr.
Associate Professors N.D. Singpurwalla, C.M. Harris, J.E. Falk *(Research)*, A.V. Fiacco *(Research)*, G.P. McCormick *(Research)*
Associate Professorial Lecturers John Waller, C.C. Sherbrooke
Assistant Professor Joseph Marsh, Jr.
Assistant Professorial Lecturer A.L. Haines

Programs in Operations Research lead to the degrees of Master of Science and Doctor of Science.

MASTER'S STUDY

The objective of the program in Operations Research is to prepare students with appropriate undergraduate backgrounds for study in depth of analytically oriented techniques of management decision-making and their applications.

Expanded scientific, statistical, and mathematical knowledge, combined with growing needs in technological as well as social areas, have created increased demands for individuals trained in operations research. The discipline of operations research uses scientific principles supported by statistical and mathematical methodology to study the function and structure of complex technical, industrial, military, and social systems in an effort to evaluate the probable effects of proposed courses of action, to establish criteria to judge the effectiveness of these courses, and to assist in the making of optimal decisions. The program in Operations Research provides a scientific basis for solving problems involving the interaction of many factors and organizational components in the interests of the whole or total problem. This breadth of interest is an example of the "systems approach" in the sense that a system is an interconnected complex of functionally related components. Most operations research efforts begin with specific aspects of the general problem in such a way that it is possible to proceed to consideration of the system as a whole. Just as the engineer may start with the study of subsystems or components of a general problem, so may the operations research analyst.

ADMISSION

In addition to the requirements for admission to graduate study (see pages 22–23), the applicant for the program in Operations Research leading to the degree of Master of Science must have an adequate knowledge of probability and statistics. This requirement can be met by satisfactory completion of the following undergraduate courses or approved equivalents: Ap S 115, *Engineering Analysis III;* Stat 191, *Probabilistic Methods for Operations Research;* and Stat 192, *Statistical Methods for Operations Research.*

REQUIRED COURSES

Core courses required in the field of Operations Research are OR 201, 202, 209, 210, and 299–300 (for those electing a thesis) or 291 (for those not electing a

thesis). Students must complete OR 201, 202, 209, and 210 before attempting any other courses; however, in certain cases, permission may be granted for concurrent registration. Students electing OR 291 normally complete this course in the last semester of the program. The remainder of the program is selected, with the approval of the adviser, generally in an area of concentration from courses in the Department of Operations Research. Appropriate courses from other departments of the University may also be approved as electives.

AREAS OF CONCENTRATION

The philosophy of the Department of Operations Research is to provide programs flexible enough to accommodate those whose interests lie in applications and those whose interests lie in theory. Examples of areas of concentration follow:

General Operations Research

OR 251: Linear Programming
OR 261: Theory of Games
OR 277: Queuing Theory
OR 279: Inventory Control

With the approval of the adviser, other courses may be elected from the Department.

Management Science

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 261: Theory of Games
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 279: Inventory Control

With the approval of the adviser, courses may be elected from the departments of Business Administration, Economics, Engineering Administration, and Management Science.

Mathematical Modeling in Information Systems

OR 251: Linear Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 277: Queuing Theory

With the approval of the adviser, courses may be elected from the departments of Electrical Engineering and Computer Science and Management Science.

Mathematical Optimization

OR 251: Linear Programming
OR 252: Nonlinear and Dynamic Programming
OR 261: Theory of Games
OR 275: Introduction to Scheduling

With the approval of the adviser, courses may be elected from Applied Science a
the Department of Mathematics.

Model Building for Transportation Flows

OR 231: Theory of Traffic Flow
OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 252: Nonlinear and Dynamic Programming
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
OR 281: Reliability Theory I

With the approval of the adviser, courses may be elected from the departments o
Civil, Mechanical, and Environmental Engineering; Engineering Administration; U
ban and Regional Planning; and from the National Law Center.

Operations Research in Industrial Engineering Systems

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 252: Nonlinear and Dynamic Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 275: Introduction to Scheduling
OR 277: Queuing Theory
OR 279: Inventory Control
OR 281: Reliability Theory I

Quantitative Decision-making for Public Policy

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 261: Theory of Games
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation

With the approval of the adviser, courses may be elected from the departments of
Civil, Mechanical, and Environmental Engineering; Economics; Public Administra-
tion; and Urban and Regional Planning.

Stochastic Modeling

OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
OR 279: Inventory Control
OR 281: Reliability Theory I

With the approval of the adviser, courses may be elected from the Department of
Statistics.

DOCTORAL STUDY

Programs in Operations Research leading to the degree of Doctor of Science

provide advanced study and research to enable the student to extend his field of knowledge and to enhance his career opportunities in research, analysis, management, administration, or education.

ADMISSION

In addition to the general requirements for admission to doctoral study (see pages 26–27), the applicant for the doctoral program in Operations Research must have a Master's degree, with a superior record of academic achievement. Outstanding professional performance is also considered in evaluating applicants.

PROGRAMS OF STUDY

Doctoral programs are planned so that the student may obtain an adequate breadth in operations research and sufficient depth in areas of specialization to permit him to complete a dissertation that will be a significant contribution to the field. Possible areas of concentration include mathematical programming, inventory, queuing, reliability, and traffic theory. In addition to the major in Operations Research, two minor areas of concentration are normally required. One minor area must be in Applied Science, Mathematics, or Statistics. The second minor area may be chosen from appropriate areas available in other departments of the University, such as Business Administration; Civil, Mechanical, and Environmental Engineering; Economics; Electrical Engineering and Computer Science; Engineering Administration; Health Care Administration; Management Science; Mathematics; and Urban and Regional Planning. The general requirements for doctoral study are stated on pages 27–30.

GRADUATE COURSES

201 Survey of Operations Research Methods I (3)

Basic concepts and techniques of operations research as applied to problems in industrial, governmental, and military decision-making. Allocation models including the simplex procedure of linear programming, transportation and assignment models, queuing theory, inventory theory, game theory, and decision-making under uncertainty. Prerequisite: Ap S 115 or equivalent. (Fall and spring)

202 Survey of Operations Research Methods II (3)

Simulation, Monte Carlo techniques; networks; integer programming; introduction to nonlinear programming; dynamic programming; reliability and replacement. Prerequisite: OR 201 or equivalent. (Fall and spring)

209 Mathematics in Operations Research I (3)

Fundamental methods and practical procedures for deterministic decision models in operations research involving a number of variables. Applications of linear models for resource allocations. Applications to data representation and algorithmic procedures for linear and nonlinear optimization models. Applications of linear algebra and real multivariate analysis. (Fall)

210 **Mathematics in Operations Research II** (3)

Fundamental methods and practical procedures for stochastic decision models in operations research involving applications of complex variable. Applications of linear differential, difference, and differential-difference systems to various areas in operations research. Applications of matrix numerical methods. (Spring)

231 **Theory of Traffic Flow** (3)

Definitions and measurement of traffic stream parameters; dynamic theories: follow-the-leader models of traffic flow; kinematic theories and fluid analogies; traffic cybernetics; statistical distributions and queuing theory; stochastic approaches to static delay problems; simulation of traffic problems. Prerequisite: Ap S 115 or equivalent. (Spring 1975 and alternate springs)

232 **Applications of Linear and Nonlinear Optimization Theory** (3)

Introduction to penalty-function and arc methods for solving linear and nonlinear optimization problems through use of existing computer codes. Formulation of optimization models in application areas of structural design, nutrition, pollution control, resource allocation, biology, economics, psychology, statistics, and chemical processes. Admission by permission of instructor. (Fall)

251 **Linear Programming** (3)

Basic computational, theoretical, and applied areas with emphasis on the general linear programming problems; simplex procedures; duality problems; parametric linear programming and sensitivity analysis, transportation problems. (Fall and spring)

252 **Nonlinear and Dynamic Programming** (3)

Basic topics in optimization theory, including convex sets and functions, optimality criteria, local and global solutions, and algorithms. Methods for solving unconstrained problems; linearly and nonlinearly constrained problems and sequential problems, including dynamic programming problems. (Spring)

261 **Theory of Games** (3)

Study of mathematical models with applications to the relationships among independent competitive entities (persons or organizations in environment of competition, bargaining, bidding), selection of optimum strategies, minimax concept, connections with linear programming, decision functions, two-person and n-person zero and nonzero sum games. (Fall)

271 **Forecasting Techniques** (3)

Regression analysis and its use as a forecasting tool; uses and limitations of time-series analysis in forecasting; business indicators and index numbers. Introduction to spectral theory: correlogram, periodogram, and spectral density. Prerequisite: Ap S 115 or equivalent. (Spring 197 and alternate springs)

273 **Digital Systems Simulation** (3)

Monte Carlo techniques, random number and random deviate generation. Simulation languages. Operating considerations, including model validation, steady-state, and statistical analyses of simulation output. Applications in inventory, queuing, and production scheduling. Prerequisites: Ap S 115 or equivalent and knowledge of FORTRAN. (Spring 19 and alternate springs)

275 **Introduction to Scheduling** (3)

Theory of scheduling with emphasis on industrial applications; assembly line balancing; sequencing and scheduling of jobs in machine shops. Mathematical optimization, heuristic programming, and computer simulation approaches to these problems are examined. Prerequisite: OR 202 or permission of instructor. (Fall 1974 and alternate falls)

277 **Queuing Theory** (3)

Single-channel exponential models, including waiting times, transient solutions, and busy periods. Additional Markovian single- and multiple-channel models, including birth-death processes, finite sources, bulk queues, Erlangian models, priorities and other disciplines, and series queues. Models with general arrival and/or service patterns. Model-building and basic solution techniques are stressed in addition to formal theoretical developments. (Spring)

279 **Inventory Control** (3)

Application of mathematical techniques to decisions regarding when and how much to produce or purchase. Various mathematical models of inventory systems with deterministic and stochastic demands, continuous and periodic review policies, multi-item models with constraints. Demand uncertainty and forecasting in inventory models. Prerequisite: Ap S 115 or equivalent. (Fall)

281 **Reliability Theory I** (3)

Review of estimation procedures, regularity conditions for maximum likelihood estimators, limit theorems, order statistics, and extreme value theory; probabilistic derivation of failure models from hazard-rate and renewal-theoretic considerations; topics in censored, truncated, and accelerated life tests for exponential and extremal types of distributions emphasizing linear and minimum-risk invariant estimators; sequential analysis and sequential life testing in both classical and Bayesian frameworks; nonparametric characterization of failure distributions and mathematical properties of failure-rate functions. Prerequisite: Stat 191, 192; or equivalent. (Fall)

291 **Problems in Operations Research** (3)

Field experience in operations research on a team basis. Each small group locates an actual problem and formulates solution by operations research models. Class evaluation of progress. (Spring)

298 **Research** (arr.)

Basic or applied research in operations research. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

351 **Advanced Topics in Mathematical Programming** (3)

Special topics, including geometric programming, branch and bound methods, max-min problems, pseudo-Boolean programming, calculus of variations, optimal control, and large-scale programming. Prerequisite: OR 252 or permission of instructor. (Fall 1975 and alternate falls)

361 **Games, Decisions, and Value Theory** (3)

General structure of statistical games: concepts of utility and optimal strategies, the invariance principle, sequential decision processes, Bayes

procedures in games. Principles of value theory: measurement of relative values, metagames, and the dominance principle. Prerequisite: OR 20... Stat 192; or permission of instructor. (Spring 1975 and alternate springs)

377 **Advanced Stochastic Models in Operations Research** (3)

Selected applied probability models, including Brownian motion, renewal theory, denumerable Markov chains, semi-Markov processes, and Markov decision problems. Applications to topics in advanced queuing and inventory theories, including busy periods, waiting times, imbedded Markov chains, and GI/G/1 queues; and conditions for optimality of (s, S) policies, stochastic leadtime problems, state-dependent leadtimes, and multi-echelon problems. Prerequisite: OR 277, 279; or permission of instructor. (Fall 1974 and alternate falls)

381 **Reliability Theory II** (3)

Nonparametric methods in reliability: increasing failure rate (IFR) and decreasing failure rate (DFR) characterizations of failure distributions; tests for IFR, DFR, and "U-shaped" distributions. Coherent structures; classes of distributions preserved under coherent structures, bounds on system reliability using modular decomposition. Drenick's theorem, preservation of monotone failure rates. Replacement: comparison of random age, and block replacement policies. Repairman problems. Redundancy optimization and allocation of redundancy. Prerequisite: Stat 192 and permission of instructor. (Spring 1976 and alternate springs)

396 **Seminar: Operations Research** (arr.)

May be repeated for credit. (Fall or spring)

397 **Advanced Topics in Operations Research** (3)

Advanced topics from the literature of operations research for analysis, presentation, and discussion. Reading assignments from the professional journals selected by the instructor and the student. May be repeated for credit. (Fall or spring)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

Required Courses in Engineering Undergraduate Curricula Offered by Columbian College of Arts and Sciences

For convenience, descriptions of required courses in undergraduate curricula which are offered by Columbian College of Arts and Sciences are listed here. See the *Undergraduate and Graduate Catalogue* for elective courses in the humanities and social sciences.

CHEMISTRY

13 General Chemistry (4)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Atomic structure, chemical bonding; chemical equations; acids and bases; chemical equilibrium; liquid and solid states; periodicity; electrochemistry; organic chemistry. Prerequisite: Math 31, Phys 2. Laboratory fee, $21. (Fall)

ENGLISH

***9 English Composition: Language as Communication** (3)
(Formerly Engl 1x)

Intensive course in English grammar and composition for students inadequately prepared for Engl 10. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 10. Engl 9 meets five hours a week and carries 3 semester hours of credit. Total fee, $301 (tuition fee of $276 plus additional fee of $25). (Fall and spring)

***10 English Composition: Language as Communication** (3)
(Formerly Engl 1)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current books; library research procedure. (Fall and spring)

GEOLOGY

136 Engineering Geology (3)

Geological principles and processes and their application to civil and mechanical engineering. Prerequisite: Math 31, Phys 2; or permission of instructor. (Spring)

MATHEMATICS

30 Precalculus (3)

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 *College Algebra* and Math 6 *Plane Trigonometry;* or one and one-half years of high school algebra, one year of high school

*Students whose College Board English Composition Achievement Test scores suggest inadequate preparation may be assigned to Engl 9 or may be tested in vocabulary, spelling, grammar, standard usage, and writing skill, before placement in either Engl 9 or 10. Students whose scores and/or writing skill indicate superior competence will be allowed to waive the Engl 10 requirement.

geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students should take a placement examination in algebra and trigonometry. (Fall and spring)

31 **Calculus of One Variable** (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30* or equivalent. (Fall and spring)

32 **Calculus of Several Variables** (3)

Partial derivatives, multiple integrals, infinite series. Prerequisite: Math 31. (Fall and spring)

PHYSICS

1 **General Physics** (4)

Topics in classical physics which form a foundation for modern physics. Prerequisite: two years of college preparatory mathematics or concurrent registration for Math 6. Laboratory fee, $11. (Fall and spring)

2 **Introduction to Modern Physics** (4)

Selected topics in modern physics, including relativity and quantum theory. Prerequisite: Phys 1 or equivalent. Laboratory fee, $11. (Fall and spring)

32 **Introduction to Theoretical Physics** (3)

Theoretical structure of physics, emphasis on appropriate analytical techniques. Prerequisite: two semesters of calculus and Phys 2.

SOCIOLOGY

126 **Urban Sociology** (3)

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development. (Fall and spring)

* Math 30 may be waived as a prerequisite by examination on scheduled dates.

GENERAL INFORMATION

Registration

THE DATES, HOURS, AND PLACE OF REGISTRATION will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

A student cannot register for classes until he has received a letter of admission to the University issued by the appropriate admitting office.

No registration is accepted for less than a semester or one summer session.

A student may not register concurrently in this University and another institution without the prior permission of the dean of the college, school, or division in which he is registered in this University. Registration in more than one college, school, or division of the University requires the written permission of the deans concerned, *prior to registration*. Allowance of credit for work done concurrently at another institution is at the discretion of the appropriate committee.

ELIGIBILITY FOR REGISTRATION

Registration for the following categories of campus students is held on the days of registration stated in the University Calendar. A student who is suspended or whose record is not clear for any reason is not eligible to register.

New Student.—Upon receipt of a letter of admission, the new student is eligible for registration on the stated days of registration.

Readmitted Student.—A student previously registered in the University who was not registered for campus courses during the preceding semester or summer session must apply for and receive a letter of readmission from the appropriate admitting office before he is eligible for registration. A student registered for the spring semester of 1974 need not apply for readmission for the fall semester 1974. Such a student is a "Continuing Student."

Continuing Student.—The student registered for campus courses in the immediately preceding semester of the academic year is eligible to register upon presentation of his Registration Card from the previous semester. The student registered for the 1974 Summer Sessions campus courses, and not restricted to summer registration, is eligible to register for the 1974 fall semester on presentation of his 1974 Summer Sessions student identification card.

REGISTRATION CHANGES AND WITHDRAWALS (see pages 152–53, 157–59)

Fees and Financial Regulations

FEES PAID BY STUDENTS cover only a portion of the cost of the operation of the University. Income from endowment funds, grants, and gifts from alumni and friends of the institution make up the difference.

The following fees and financial regulations were adopted for the 1974 Summer Sessions and the academic year 1974–75. (See pages 150–51 for projected tuition and fee increases for 1975–78.)

Tuition Fees

For undergraduate study:

Full-time program (12 or more hours a semester)	$1,250.00
Part-time program, for each semester hour	92.00

For graduate study* (except for those students registered before July 1, 1967, who wish to continue payments in accordance with the plan (see below) in effect prior to that date):

For each semester hour for which the student registers	92.00

Doctoral students not enrolled under the payment plan in effect before July 1, 1967, are required to register for minimum hour-loads,† as follows:

1. Full-time doctoral students must register for a minimum of 12 semester hours a semester until 24 hours of work have been completed beyond the qualifying examination; and a minimum of 4 semester hours a semester thereafter until the satisfactory completion of the final examination.
2. Part-time doctoral students must register for a minimum of 6 semester hours a semester until 24 hours of work have been completed beyond the qualifying examination; and for a minimum of 4 semester hours a semester thereafter until the satisfactory completion of the final examination.

For candidates for Master's degrees registered prior to July 1, 1967, who wish to continue payments according to the plan in effect to that date:

Total fee, including the Master's Comprehensive Examinations‡	2,500.00

For students registered for the degree of Doctor of Science prior to July 1, 1967, who wish to continue payments according to the plan in effect prior to that date:

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* Registration in thesis courses (299–300) entitles the student, during such registration to the advice of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished an additional semester will be granted, requiring payment of a "continuous registration" fee (see page 150). If the preparation of the thesis extends beyond the three-semester period, approval for this extension will be required and the student must repeat the thesis course 300 and pay tuition as for a repeated course, provided the over-all time limit for earning the degree is not exceeded.

† No minimum hour-load is required during the summer sessions.

‡ Students completing payment of the total fee before completion of the required work (including thesis and comprehensive examinations) will be granted registration on a "continuous registration—no charge" basis for one semester immediately following the semester in which tuition payment is completed.

Students requiring additional time for completion of required work after completion of payment of the total fee and the expiration of a semester "continuous registration—no charge" must register each semester and pay the normal "continuous registration" fee. See pages 160–61 for regulations governing Military Leave.

For work leading to and including the qualifying examination*..... $2,450.00
For work leading to and including the final examination*..... 2,450.00

University Center Fee (charged all students registered on campus,† nonrefundable)

For students registered for 11 or more semester hours on campus:
Each semester 43.00

For students registered for less than 11 semester hours in a semester on campus:
For each semester hour for which the student registers..... 4.00

For students maintaining "continuous registration" status:
Each semester 4.00

Additional Course Fees

In certain courses additional fees, such as laboratory and material fees, are charged. These fees are charged by the semester and, unless otherwise indicated, may be defrayed in two payments when the tuition is paid in this manner. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the laboratory fee the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Bachelor's, Master's, Doctor's degrees..... $25.00

Fee for Binding Master's Thesis..... 10.00

Fee for Microfilm Service and Printing Announcement of Final Examination for the Doctoral Degree..... 60.00

Residence Hall Fees (see page 167).

Special Fees

Application fee (undergraduate degree candidates) nonrefundable 10.00
Application fee (graduate degree candidates), nonrefundable..... 25.00

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* If the tuition for the first stage is paid in full at the beginning of the first stage of the doctoral discipline, the candidate is entitled to five successive semesters on a "continuous registration—no charge" basis. If still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.
If the tuition is paid in four installments at the rate of $612.50 a semester at the beginning of the first stage of the doctoral discipline, no continuous registration fee will be charged if a third year is needed for completion of the first stage of the degree requirements. If still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.
If the tuition is paid in six installments at the rate of $408.33 a semester and if still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.
If the tuition for the second stage is paid in full at the beginning of the second stage of the doctoral discipline, the candidate is entitled to three successive semesters on a "continuous registration no charge" basis. If still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.
If the tuition is paid in two installments at the rate of $1,225.00 a semester at the beginning of the second stage of the doctoral discipline, no continuous registration fee will be charged if a second year is needed for completion of this stage of the discipline. If the tuition is paid in four installments at the rate of $612.50 a semester at the beginning of the second stage and still more time is needed, the student must maintain continuous registration and pay the continuous registration fee.

† Students in off-campus programs are charged the University Center Fee only when registered for courses on campus.

Tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student	$100.00
Application for room reservation, nonrefundable, charged each resident student	100.00
Admission tests (when required)	6.00–12.00
Late-registration fee, for failure to register within the designated period	15.00
Late payment fee, charged for failure to make payments when due (see "Payment of Fees," page 151)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," page 151)	35.00
Returned check fee, charged a student whose check is returned because of insufficient funds or improper drafting	15.00
Continuous registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements*—due and payable on the official days of registration	92.00
Engineers' Council fee, charged each student in the School of Engineering and Applied Science for each semester or any part thereof except the summer term	5.00
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25.00
For each examination to qualify for advanced standing and for each special examination	5.00 5.00
English test for foreign students (when required)	5.00
Laboratory checkout fee, for failure to check out of chemistry laboratory by the date deadline set by the instructor†	2.00
Transcript fee, for each transcript of record	

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student and Alumni Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES 1975–78

In order that students and their parents may plan more realistically for a total four-year period, tuition increases for the academic years 1975–76, 1976–77, and 1977–78 have been estimated as follows:

Increase by year (full-time undergraduate students):	
1975–76	$100.00
1976–77	100.00
1977–78	200.00

* Payment of the continuous registration fee entitles the student to return and continue his work toward a degree under the academic requirements which were in force at the time of his first registration. The continuous registration fee applies toward neither tuition fee nor residence requirements for the degree. (See also footnotes on pages 148 and 149.)

See pages 160–61 for regulation governing Military Leave.

† A student who drops a chemistry course before the end of the semester must check out of the laboratory at the next regular laboratory period.

*Increase by semester hour (graduate and part-time undergraduate students):

1975–76	$4.00
1976–77	4.00
1977–78	7.00

The University Center Fee will be increased for the 1975 summer sessions and the academic year 1975–76. For students taking 11 or more semester hours, the fee will be $46.50 a semester, an increase of $3.50. Students taking less than 11 semester hours will pay $4.35 a semester hour, an increase of $.35.

Every effort will be made to keep tuition increases within the above limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment in these estimates.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made out to George Washington University.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for six semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 23, 1974 (for the fall semester), and March 5, 1975 (for the spring semester). Interest at the rate of eight per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made. The University will not obligate itself to notify the student, in advance, of the payment-due date for the second half of the semester charges.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $525 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of eight per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his right to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

*Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

PREPAID AND DEFERRED PAYMENT PLANS FOR PARENTS

Several commercial programs for parents who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 1910
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the Dean of the School. Notification to an instructor is not an acceptable notice (see "Withdrawal," pages 157–59).

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters.

1. *Complete withdrawal* from the University:

   Fall Semester

Withdrawal dated on or before September 6, 1974	90 per cent
Withdrawal dated September 9 to September 20, 1974	75 per cent
Withdrawal dated September 23 to October 4, 1974	50 per cent
Withdrawal dated after October 4, 1974	none

   Spring Semester

Withdrawal dated on or before January 17, 1975	90 per cent
Withdrawal dated January 20 to January 31, 1975	75 per cent
Withdrawal dated February 3 to February 14, 1975	50 per cent
Withdrawal dated after February 14, 1975	none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal* by a *part-time student*, the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in an undergraduate full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for complete withdrawal from the University (see No. 1, above). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," pages 159–60).

* Regulations concerning withdrawals and refunds for the Summer Sessions are stated in the *Summer Sessions Catalogue*.

5. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be refunded or reduced because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred, and in no case will this be credited to another semester.

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

Financial Aid*

FOR UNDERGRADUATE STUDY

THE GEORGE WASHINGTON UNIVERSITY has a program of financial assistance for undergraduate students in the form of scholarships, loans, grants, part-time employment, or any combination of these resources. The University participates in the National Direct Student Loan, Supplemental Educational Opportunity Grant, and College Work-Study programs. Financial aid is awarded on the basis of the student's scholastic record, financial need, and qualities of leadership.

Applications and supporting credentials for financial aid must be filed by February 1 (entering freshmen), March 1 (enrolled undergraduate or entering transfer students) preceding the academic year of the award for the fall semester; by November 1, for the spring semester; and by May 1, for the summer sessions†. A student must reapply for financial aid each year.

Complete information concerning financial assistance is contained in the pamphlet "Student Financial Aid," which is available at the Office of Student Financial Aid, George Washington University, Washington, D.C. 20006.

SCHOLARSHIPS AND GRANTS

Scholarships are awarded for the academic year unless otherwise specified and are credited in equal parts for each semester. Each holder must carry a full schedule of academic work during the period for which the scholarship is awarded.

The following scholarships are limited to students in the School of Engineering and Applied Science. The University offers many others which are open to engineering students.

Frederick Albert and Alma Hand Britten Scholarships (1959).—Bequest of Alma Hand Britten for scholarship assistance to students entering the School of Engineering and Applied Science who would not otherwise be able to pursue such professional study. Available for undergraduate and graduate study.

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*For information concerning financial aid for students from foreign countries, see page 156.

†A Summer Sessions student is eligible for consideration only if he is enrolled in this University for at least 8 semester hours in the immediately preceding spring semester or has applied for financial aid for the following fall semester.

Henry Harding Carter Scholarship (1896).—Established by Maria M. Carter in memory of her husband to aid a deserving student who is preparing for the civil engineering profession. Available to students working toward the degree of Bachelor of Science (Civil Engineering).

Henry Parsons Erwin Scholarship (1955).—Established by Helen B. Erwin as a memorial to her husband, a former Trustee of the University. A partial scholarship for a student in Engineering and Applied Science.

Louis E. Giles Memorial Scholarships (1966).—Bequest of Susie E. Giles in honor and memory of her husband for scholarships to undergraduate and graduate students in the School of Engineering and Applied Science requiring financial assistance.

George Washington University Board of Trustees Scholarships.—Full- and partial-tuition undergraduate scholarships which begin in the fall semester and extend for four successive academic years, provided the holder maintains a *B* average, as well as a high standard of deportment, and continues to be in financial need. Candidates must plan to select a curriculum leading to a Bachelor's degree.

FOR GRADUATE STUDY

SCHOLARSHIPS, FELLOWSHIPS, ASSISTANTSHIPS

The George Washington University program of financial assistance for graduate students includes graduate scholarships, fellowships, assistantships, and loans. Application for admission to graduate study is a prerequisite for consideration. The University participates in the National Direct Student Loan and College Work-Study programs.

Application and correspondence concerning graduate scholarships, fellowships, or assistantships, unless otherwise specified, should be sent directly to the Dean of the School, and addressed to George Washington University, Washington, D.C. 20006. Unless otherwise specified, application and supporting credentials should be submitted not later than March 1 preceding the period for which the award is made.

Frederick Albert and Alma Hand Britten Scholarships (1959).—See page 153.

Paul H. and Margaret M. deMaine Scholarships (1967).—Full and partial scholarships for graduate students whose research involves the use of computers. Inquiries should be made to the Director of the Computer Center of the University.

Louis E. Giles Memorial Scholarships (1966).—See above.

Phi Delta Gamma Scholarship Endowment Fund (1968).—Established by the Beta Chapter of Phi Delta Gamma, national fraternity for graduate women. For graduate women students.

Graduate Teaching Fellowships.—Available to students in Master's and doctoral programs. Each teaching fellow renders a designated unit of service to his major department of instruction and receives a stipend of up to $3,000 (on a 9-month basis), plus tuition, course fees, and University Center fee.

National Science Foundation Graduate Fellowships.—Fellowships leading to graduate degrees in the mathematical, physical, medical, biological, engineering, and social sciences, and in the history and philosophy of science; providing tuition, fees, and stipends. Open to students who have been admitted to graduate status and who have completed less than one calendar year of graduate

study. Applications should be made to the Fellowship Office, National Research Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

Research Assistantships in Operations Research and Related Fields.—Available to graduates, and to undergraduates on the junior and senior levels, in any school of the University. Research Assistants are expected to work 20 hours a week conducting research in support of an established research program, in programming or in conducting individual research on an approved research project. Stipends vary from approximately $3,300 to $6,800, depending on the status of the student and the tenure of the appointment (9–12 months). Further information and applications are available from the Director, Institute for Management Science and Engineering, School of Engineering and Applied Science, George Washington University, Washington, D.C. 20006.

Research Scholar Assistantships, GWU—NASA-Langley Program.—See page 34.

Resident Assistantships (men and women).— Available to graduate students and seniors in any field of study who are interested in working with the student personnel program in University residence halls. Specific duties vary with the position, but basically consist of counseling, advising student groups, and administration. Remuneration includes full tuition and a furnished room for the academic year. All positions are part-time, and staff members are required to enroll as full-time students in degree-granting programs. Application should be completed before March 1. Further information may be obtained from the Office of the Director of Housing.

LOAN FUNDS

Several loan funds are available to students in the University in accordance with the qualifications placed thereon by the donors. Two loan programs limited to students in the School of Engineering and Applied Science are available. Students should direct inquiries to and file applications with the Office of Student Financial Aid. Applications for the National Direct Student Loan should be filed no later than April 1 for the spring semester. Complete information is contained in the pamphlet "Student Financial Aid," which is available in the Office of Student Financial Aid, George Washington University, Washington, D.C. 20006.

Warren Stickler Memorial Loan Fund (1966).—A fund established by the Precision Measurements Association as a memorial to Warren Stickler is available to engineering students.

John Brewster Willis, Jr., Loan Fund in Mechanical Engineering.—Established by Mrs. William L. Lane as a memorial to her nephew, John Brewster Willis, Jr., available to Mechanical Engineering students (graduate or undergraduate) who are primarily interested in aeronautics.

A number of short-term emergency loan funds are also available at the University. Information concerning these funds is available from the Office of Student Financial Aid.

STUDENT EMPLOYMENT

The University participates in the College Work-Study Program. Inquiries should be addressed to the Office of Student Financial Aid. In addition, the

Student and Alumni Career Services Office maintains a registry of both full-time and part-time positions available in the Washington Area for undergraduate and graduate students.

After registration, students may apply at the Student and Alumni Career Services Office, Woodhull House, 2033 G Street, N.W., for interviews and referrals to positions for which they are qualified.

FOREIGN STUDENTS

Undergraduate foreign students with proven financial need who have completed one semester of full-time work (15 hours) at this University with a *B* average (3.00) or better are eligible to apply for University Board of Trustees Scholarships. Scholarships are awarded in the spring for the following academic year. See instructions for applying for undergraduate financial aid, page 153.

Limited awards for graduate teaching fellowships are the responsibility of the chairman of the department or dean of the school in which the degree is to be earned. Work as a teaching fellow requires excellent knowledge of English—both spoken and written.

Long-term loan funds for undergraduate and graduate foreign students are limited in amount and are available only to those foreign-born persons who have established resident status in the United States through the Immigration and Naturalization Service.

Students who wish to study in the United States should have available sufficient funds to cover expenses for one full year before attempting to enter a college or university. The cost at this University for one academic year (September–May) is approximately $5,000. This estimate includes room and board, tuition, books, clothes, and incidental expenses; no travel, holiday, or medical expenses are included.

Prizes

Norman B. Ames Memorial Award.—Established by many friends of Professor Ames and awarded annually to a graduating senior of the School of Engineering and Applied Science who is nominated by his fellow students as having made significant contributions to the students in the School of Engineering and Applied Science and to the School and University.

Martin Mahler Prize in Materials Testing.—A one-year membership in the American Society for Testing Materials awarded to the upper division or graduate student in engineering who submits the best reports on tests in the materials laboratories course with preference given to prestressed concrete tests.

School of Engineering and Applied Science Distinguished Scholar.—A certificate awarded annually by the Faculty of the School of Engineering and Applied Science to the senior who graduates with the highest scholastic standing. The student's name is engraved on a plaque displayed in Tompkins Hall of Engineering.

Sigma Tau Prize.—A medal awarded annually by Xi Chapter to the freshman in the School of Engineering and Applied Science who maintains the highest scholastic standing in the work of the entire year.

Theta Tau Activities Plaque.—A plaque awarded annually by Gamma Beta Chapter to the senior in the School of Engineering and Applied Science with the most outstanding record in activities for the entire period of his attendance.

Regulations

A STUDENT ENROLLED in the School of Engineering and Applied Science is required to conform to the following regulations.

A student who withdraws or is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue his work only under the rules and regulations in force at the time of his return.

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, his registration may be canceled. If such falsification is discovered after the student has established an academic record at the University, he may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Faculty) for subsequent registration in the University.

ACADEMIC DISHONESTY

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the appropriate dean's council, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the Dean's Council, the disciplinary grade of "Failure—Academic Dishonesty" will be recorded for the course involved, and this grade will be employed in the computation of the quality-point index. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

CHANGES IN PROGRAM OF STUDIES

A student may not make any changes in his approved program of studies without the approval of the Dean. Requests for change in class registration must be made on a form provided in the School Office.

During the seven days following the first day of classes of a semester, courses may be added to the student's program with the approval of the instructor, the faculty adviser, and the Dean.

Courses may be dropped by undergraduate students without academic penalty only during the fourteen days following the first day of classes, with the approval of the instructor, the student's adviser, and the Dean. Courses may be dropped by graduate students without academic penalty only within the first four weeks of a semester, with the approval of the instructor, the faculty adviser, and the Dean.

WITHDRAWAL

A student who withdraws or is otherwise absent from the University for one semester or more must apply for readmission. If readmitted, he continues his



work under the requirements and regulations in force at the time of his readmission.

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the Dean of the School. Notification to an instructor is not an acceptable notice.

Withdrawal from a course or from the University, *without academic or financial penalty*, requires the permission of the Dean of the School. Permission to withdraw from the University will not be granted to a student who does not have a clear financial record.

Withdrawal from any course without academic penalty after the fourteenth day following the first day of classes of a semester may be granted by the Dean to undergraduate students only under the following conditions: (1) exceptional circumstances make the request necessary; (2) the request is submitted on the official form for late withdrawal; (3) as of the date of request, the grades in all courses involved are *C* or better. In exceptional circumstances the Dean may authorize withdrawal for graduate students without academic penalty after the first four weeks of a semester. In all cases financial regulations governing withdrawal remain in full effect.

All charges for courses dropped without the approval of the Dean must be met by the student. Reporting the dropping of a course to an instructor does not effect its discontinuance.

CREDIT

Credit toward a degree is given only after registration for and satisfactory completion of the required work of a course or upon the granting of advanced standing. A student who takes a course as an auditor may not take the same course later for credit.

On request the Registrar will issue to undergraduate degree candidates a balance sheet showing the amount of work completed and the requirements remaining to be met for the degree.

TRANSCRIPTS OF RECORD

Official transcripts of student records are issued by the Registrar on request of the student or former student who has a clear financial record. A fee of two dollars is charged for each transcript.

SUMMER SCHOOL CREDIT

A student who plans to attend summer school at another institution and apply credit so earned toward graduation from this University must first secure the written approval of the Dean. In no event will credit in excess of what might be earned in a similar period in this University be recognized.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until all degree requirements are satisfied. Students who have completed course registration (including the thesis) maintain continuous registration by paying the "continuous registration" fee (see page 150). By failing to register for one

semester or more, the student breaks his registration and must be readmitted. The procedure for readmission to the graduate programs is the same as that for undergraduates (see pages 15–16). A "Readmitted Student" is required to satisfy the academic requirements existing at the time of his readmission.

Students must be registered during the summer if they are taking courses, are taking required examinations, are receiving guidance on theses or dissertations, or are expecting to graduate at the end of the Summer Sessions.

GRADUATION REQUIREMENTS

To be recommended by the Faculty for graduation a student must have met the admission requirements of the School; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which he is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session immediately preceding the awarding of the degree.

Application for Graduation.—An "Application for Graduation" form must be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the senior or final year.

Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

Attendance and Conduct.—The University reserves the right to refuse to confer a degree upon a candidate whose attendance or conduct has been unsatisfactory.

THE LIBRARY

All students registered in the University have the privilege of using the University Library. Its stacks are open, and all students are welcome to browse at their leisure. The student's current Registration Card, issued upon the payment of fees, must be presented when books are borrowed for outside use.

The loan period for stack books is 14 days. A fine of 25 cents is charged for each day a book is overdue. Any book which circulates is subject to recall by the Library if needed for reserve or other use. Reserve books must be used in the reserve reading room when the Library is open, except that they may be withdrawn for overnight use beginning at 8:30 p.m. A fine of 50 cents is charged for each hour or fraction thereof that a reserve book is overdue. Grades of a student are withheld until his library record is clear.

All students using the University Library are expected to be familiar with its detailed regulations, available at any of the Library's service desks.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to his Dean of a copy of his orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, he must apply for readmission to the University well in advance of the semester in which he expects to return. Payments for tuition and fees which are not refunded to the student at the time

be is granted military leave will be maintained as a deferred credit for his account and use upon his return to the University.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; dates of attendance; verification of date and place of birth; degrees earned (if any), date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1 above.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "Lost and Found" Office is located on campus in the Safety and Security Office.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 191–93) contains regulations recently approved by the University's Board of Trustees.

Consortium of Universities of the Washington Metropolitan Area, Inc.

THE UNIVERSITIES IN WASHINGTON, D.C.—American University, Catholic University of America, *George Washington University*, Georgetown University, and Howard University—are associated in a Consortium through which they coordinate the use of their respective facilities; District of Columbia Teachers College, Gallaudet College, and Trinity College are associate members of the Consortium. Students in approved programs leading to degrees in any one of these institutions have the opportunity to select from the combined offerings of all the particular courses which best meet their needs.

Participation is limited to campus degree candidates. The following, however, are excluded: students in Canon Law, Dentistry, Medicine, and Theology. Law students are also excluded from participation, except for candidates for the degree of Master of Laws at George Washington University and Georgetown University.

In special courses involving private instruction (as in music or art) or tutorial study, if a special fee is charged, this fee is not covered by the Consortium agreement and must be paid by the individual student to the institution administering the course. A student interested in registering for Reserve Officer Training Corps (ROTC) courses should consult the Registrar at his institution.

Students interested in taking courses at an institution other than their own should consult the program announcements of the other institutions. Consortium application forms and instructions are available from the Registrar after the student has obtained his registration packet. In order to participate in the Consortium program (1) the graduate student must obtain the approval of his adviser and should ascertain from the department of the institution where the course is taught whether or not he is eligible for the course and whether there is a space in the class, *or* (2) the undergraduate student must obtain the approval of his adviser and *must* ascertain from the department of the institution where the course is taught whether or not he is eligible for the course and whether there is space in the class. Specific inquiries should be addressed to the Registrar. *A student may not take courses at another institution that are available at his own.* The student registers and pays at his own institution for all Consortium courses.

University Computer Center

THE UNIVERSITY COMPUTER CENTER is located on the first floor of Stuart Hall, 2013 G Street, N.W. The facilities of the Center are available for academic purposes to all registered students and to members of the instructional staff

The Center has as its principal mission the provision of a powerful computing system which serves the University in its educational, research, and administrative endeavors. The Center's programming staff concentrates its efforts in conducting faculty and staff seminars, consulting with users in the design and preparation of complicated programs, and carrying out computer-oriented research.

The Computer Center equipment consists of an IBM system 370 Model 145 computer with large capacity on-line disk storage, a card read/punch, a high-speed line printer, and four tape drives. The principal languages available to the user are FORTRAN IV, COBOL, Programming Language One (PL/I), Assembler Language, and ALGOL. In addition, numerous utility, statistical, data manipulation, and simulation systems and special languages are available in the library of programs. Facilities are available on a first-come, first-served basis for preparation of programs and data.

Computer programming courses are offered by the School of Government and Business Administration, the Department of Statistics, and the School of Engineering and Applied Science. In addition, many other departments offer courses that utilize the computer as a research adjunct to course work.

The Computer Center is normally open 24 hours a day, seven days a week.

The Speech and Hearing Clinic

THE SPEECH AND HEARING CLINIC offers diagnostic and remedial work for children and adults with such communication difficulties as stuttering, lisping, cleft palate speech, and cerebral-palsied speech; and with voice, articulatory, and hearing problems. Diagnostic and remedial work is also available for persons with nonstandard language usage due to such conditions as hearing loss, brain damage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $24. Fees for additional specialized testing are dependent on the testing involved. The fees for individual speech or hearing therapy range from $3 to $12 a session. Fees are reduced for full-time students enrolled in the University and for persons receiving group therapy. Fees are payable at the Office of the Cashier.

The Reading Center

THE READING CENTER offers individual diagnostic and corrective services for all levels: primary, elementary, secondary, and adult. In addition, special reading improvement classes are conducted for high school and college students as well as other adults.

A complete diagnosis includes psychological tests; vision, hearing, dominance, and spelling tests; and various types of reading achievement and aptitude tests. Results are interpreted, and a written report is presented in conference with the parents or the individual.

The special reading improvement classes for high school students, college students, and other adults are offered throughout the year at stated intervals. Emphasis is placed on improvement of vocabulary, speed, comprehension, and

study skills. Instruction in spelling is also provided as needed. Mechanical aids such as the tachistoscope, rate accelerator, and controlled reader are available for increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $90; for individual instruction, $10 a lesson; for semi-individual instruction, $7 a lesson; for instruction in small groups, secondary level, $6 a lesson. Reading classes (15 two-hour sessions) are offered for adults, $140; for full-time George Washington University students and faculty, $65. All fees are payable in advance at the Office of the Cashier.

Veterans Education

THE OFFICE OF THE REGISTRAR assists students entitled to educational benefits as veterans or war orphans with any problems which may arise concerning their benefits. This Office also processes certification of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans should consult the Office of the Registrar prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D.C. 20421.

Alumni Associations

THE GENERAL ALUMNI ASSOCIATION

THE OBJECTIVES OF THIS ASSOCIATION are to unite the graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the University and who have left the University in good standing, or any person who is or has been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those who are life members of The George Washington University General Alumni Association or the Alumni Association of any school of the University, or are current contributors to the George Washington University Fund.

All alumni are urged to keep the Alumni Office informed of changes of address or occupation and to supply information with regard to their fellow alumni.

THE ENGINEER ALUMNI ASSOCIATION OF THE GEORGE WASHINGTON UNIVERSITY, INC.

The Engineer Alumni Association was organized in 1936 and incorporated in

963 to coordinate with the General Alumni Association those activities of rimary interest to the engineering alumnus. The objectives of the Association re to provide the link between the graduates and Faculty of the School, to elp promote the general welfare of the School of Engineering and Applied cience and of the University, to foster activities of the engineering organizaons recognized by the University, and to advance the engineering profession n general.

In 1966 a board of directors, comprised of fifteen elected members of the ssociation and the Engineers' representatives serving on the Governing oard of the General Alumni Association, was established. The membership f the board of directors was expanded in 1969 to include the Director of lumni Relations and one representative each from the Faculty of the School nd the student body. Members of the Association are elected each year, prior o the June meeting, to three-year board memberships as listed below:

Term Expiring 1974
Merrill R. Brown
John A. LeReche
Caldwell McCoy
W. Thomas Packard
Harold B. Thomasson

Term Expiring 1975
Thomas W. Chappelle
Issa Khozeimeh
John R. Manning
Richard Pronk
Elmer W. Whitlock

Term Expiring 1976
Matthew Flato
Norris C. Hekimian
James Sinsabaugh
Marjorie Townsend
John L. Wolfgang, Jr.

General Alumni Association Representatives
John R. Manning
Edward A. Wareham III

Director of Alumni Relations
Ellwood A. Smith

Faculty Representative
Galip M. Arkilic

Student Representative
David Fennell

Regional Director
William H. Holt

Past President
Douglas L. Jones

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t the June meeting each year the board elects officers for its operation during e upcoming year. The officers for the years 1973–74 are

esident.—John R. Manning, B.S. in Engr. 1957, J.D. 1961; 2774 N. Wakefield Street, Arlington, Va. 22207

ice President.—Matthew Flato, B.E.E. 1949; 8519 Milford Avenue, Silver Spring, Md. 20910

cretary.—Issa Khozeimeh, B.S. (E.E.) 1967, M.S. 1973; 4537 Albermarle Street, N.W., Washington, D.C. 20016

easurer.—Thomas W. Chappelle, M.E.A. 1965; 6166 Leesburg Pike, Falls Church, Va. 22044

STUDENT LIFE

THE OFFICE OF THE VICE PRESIDENT FOR STUDENT AFFAIRS develops Student Life programs, policies, and procedures to complement the University's formal instruction program. These activities are implemented through the offices of the Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Educational Opportunity Program, Housing, International Students, Student Activities, Student and Alumni Career Services, and Student Health Service.

STUDENT SERVICES

OFFICE OF THE DEAN OF STUDENTS

The Office of the Dean of Students provides counseling and information to the general student body, and assists in program development on campus, particularly in the residence halls. The members of the staff of the Dean of Students Office are informed on University policies and student services provided on campus, enabling them to provide referrals and answers to many questions concerning general student life. Personal letters of recommendation for students applying to graduate and professional schools can also be obtained from the Dean of Students Office. The Dean of Students works with the Adviser to International Students, the Director of the Counseling Center, the Director of the Educational Opportunity Program, and the Director of Housing in the implementation of their programs.

HOUSING

Complete information concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20006. Information concerning off-campus housing near the University may be obtained at this Office. The reservation of rooms in private houses must be made by students.

Admission to the University does not include a room reservation. The student will receive, with his notification of acceptance, University residence hall information, an application for residence hall space, and a declaration of intent to attend the University. The application for residence hall space must be accompanied by a $100 *nonrefundable deposit*. The housing deposit is credited

toward the first semester's room charge. Rooms are leased for the academic year, and lease payment must be made by July 15 for the fall semester.

1974–75 RESIDENCE HALL RATES PER PERSON FOR TWO SEMESTERS*

For Men:	
Calhoun Hall	
double room	$875
triple room	825
For Women:	
Strong Hall	
single room	925
double room	875
For Men and Women:	
Crawford Hall (limited to sophomores, juniors, and seniors)—double room	825
Mitchell Hall—single room	925
Thurston Hall	
double room, triple room, large room for four	875
suite for six	825
Graduate Men and Women Only:	
Graduate Hall—apartment for two and three	925
Madison Hall—double room	875

FOOD SERVICE

Resident freshmen and sophomores are required to participate in the food service plan. Freshmen must participate in the seven-day, 20 meals per week plan, at the rate of $720* for the academic year. Sophomores may elect either the 20-meal plan or a five-day meal plan, 15 meals Monday through Friday, for $690* for the academic year. Either plan is optional for junior, senior, and graduate students. Food service payment does not cover University intersession or vacation periods. All meal cards admit bearer to the dining room in Thurston Hall and the second floor contract dining room in the Cloyd Heck Marvin Center.

MUNSON HALL APARTMENTS

Munson Hall is a University-owned and operated apartment house containing 25 one-bedroom and 54 efficiency apartments. Graduate and married students are given priority for residence until July 15 each year. Seniors and juniors who have lived at least one year in University residence halls will be considered for residency after that date if space is available. All leases are for 12 months.

EDUCATIONAL OPPORTUNITY PROGRAM

The Educational Opportunity Program is designed to offer a college education primarily to black and other minority students who are graduates of District of Columbia high schools and/or other qualified District residents. It provides an opportunity for a student to seek a degree in almost any field and at the same time receive academic and/or financial assistance.

*Residence Hall and food service prices subject to change.



CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

The Center Governing Board, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. This Board works closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

STUDENT HEALTH SERVICE

The Student Health Service is an outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the academic year from 9 a.m. to 5 p.m. and from 6 to 10 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. This schedule is also maintained during the Summer Sessions, except that the evening closing hour Monday through Friday is 9 p.m.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed his connection with the University is ineligible for medical benefits of the Student Health Service. Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, X-ray work and referrals to specialists or other outside physicians) are the responsibility of the student. Within the Student Health Service, there will be only a few small charges for some services, such as materials for an allergy injection series, overseas immunizations, and certain other services.

Any student who intends to train for an athletic team is required to pass a thorough medical examination. The University is not responsible for injuries received in intercollegiate or intramural games, or in any of the activities of the Department of Physical Education, Health, and Recreation.

HEALTH AND ACCIDENT INSURANCE

The Student Health Service Office has arranged for Health and Accident Insurance, on an elective basis, for those *full-time students* who do not have other coverage. Interested students should consult the Student Health Service Office.

COUNSELING CENTER

The Counseling Center offers services designed to assist students in the diag-

nosis and treatment of academic, personal, and social problems. The Center also offers vocational counseling and programmed instruction, and refers individuals to qualified agencies for assistance with problems not handled by the Center. Behavior therapy, individual and group psychotherapy, and individual and group counseling are also available.

The Center also provides special assessments including diagnostic measures prescribed by the School of Engineering and Applied Science, admissions tests for the University and for other selected educational institutions, and some selected assessments for business and industry.

Fees.—Students who are currently registered as degree candidates in the University are entitled to one interview without charge. If the student decides to continue to use the services offered, a minimum flat fee of $30 will be charged for short-term treatment. Fees for testing an long-term treatment depend upon the services involved. All fees are payable at the Counseling Center Office.

INTERNATIONAL STUDENTS

International House is the campus center for students from foreign countries. It serves also as the headquarters of the International Students' Society which seeks to promote international friendship and understanding by welcoming to its membership students from all countries, including those from the United States.

The Adviser to International Students has his Office in International House and is available each day throughout the school week for consultation on immigration regulations and on any matters concerning the social and academic welfare of the foreign student.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

The Student and Alumni Career Services Office provides assistance to degree-seeking students and alumni seeking full-time, part-time, temporary, or permanent employment. All students are urged to become acquainted with the services of this Office early in their college experience.

Counseling concerning trends in employment, areas of employment, various test and examination announcements, preparation for job interviews, resume-writing, and other procedures for successful job application are always available. Specific career openings; an on-campus recruitment program by business, industry, government, and school systems; volunteer opportunities; and part-time and temporary jobs for students while attending school are all part of this service. Referral and placement functions of the on-campus College Work-Study Program are handled by the Student and Alumni Career Services Office. Teacher credential files initiated by persons seeking employment in all educational fields are maintained in this Office.

An understanding and knowledgeable approach to avenues of service for those people who do not find career satisfaction in structured systems of business, government, and education is also provided in the Student and Alumni Career Services Office.

RELIGIOUS LIFE

The University recognizes the contribution that religion makes to the life of its students and encourages them to participate in the various religious organiza-

tions of their own choice. Catholic, Jewish, and Protestant bodies sponsor various groups and form a link between the University and the religious community. The advisers of the religious organizations are available for counseling.

Religious services in various traditions are provided regularly for the University community as announced.

DAVIS-HODGKINS HOUSE

The Davis-Hodgkins House is the student center of the School of Engineering and Applied Science, providing lounges, reading rooms, and student organization offices. The House provides convenient, comfortable facilities for the exchange of ideas and good fellowship.

STUDENT ACTIVITIES

The offices of the Vice President for Student Affairs, the Dean of Students, the Director of the Cloyd Heck Marvin Center, and the Director of Student Activities are responsible for all co-curricular phases of student life.

STUDENT ACTIVITIES OFFICE

The Student Activities Office assists individual students and organizations in program development, campus leadership training, and participation in special projects—both within the University community and in the community at large. This Office also serves as a central clearinghouse for development and maintenance of a master activities calendar—for registering and assisting campus organizations, for scheduling facilities (except in the Marvin Center) and events, and for informing the University community of the many activities and programs which can enrich the educational experience through a variety of weekly, monthly, and annual publications. The Student Activities Office is also responsible for coordinating a comprehensive orientation program for new students entering the University. Students interested in participating in the many social, cultural, or extracurricular phases of University life should acquaint themselves with the facilities and functions of the Student Activities Office and its staff.

UNIVERSITY COMMITTEES AND ORGANIZATIONS

The George Washington University is an active, working community where student involvement has become a motivating force in the governance of the University through the committee structure. This involvement has helped develop policies and programs beneficial not only to the student population, but to the total University community. While serving on these committees, student members are able to participate in the formulation and the application of ongoing institutional policy.

There are numerous committees on which members of the student body are able to serve. The Student Activities Office has a relatively complete file on major committees, and interested students should inquire there for further information. Additional information is also contained in the *Student Handbook*. A brief description of some of these committees follows:

Joint Committee of Faculty and Students.—This administrative committee, created in response to a resolution of the Faculty Senate, is composed of seven faculty members, seven student members, and other ex officio members. Members of this Committee are appointed by the President.

The Committee is officially charged to "facilitate all efforts to improve student-faculty relations," to "encourage student recommendations in all areas of Senate policy-formulation which affect student life," and to "recommend changes in the 'Rules and Regulations Governing the Conduct of Student Life.'" The Committee has specific advisory powers in many areas concerning student-faculty relations and the interests of the student body.

Committee on the Judicial System.—The Committee on the Judicial System is composed of three faculty members and three student members, one of whom is the Chairman of the Student Court, one a student member of the Student-Faculty Committee on Appeals, and one selected from the campus at large. The Committee on the Judicial System works closely with the Executive Secretary to the Judicial System to make sure that the various hearing bodies are efficiently, fairly, and expeditiously conducting their business.

Other committees include the following: the Committee on University Parking, the Committee on Religious Life, the Committee on Sponsored Research, the Committee on Student Publications, and the Committee on the University Bookstore.

THE STUDENT NOMINATING BOARD

This all-student board was created by the President upon the recommendation of the Joint Committee of Faculty and Students in February, 1971. The Board was established "to make appointments to all University Committees that have student members where there is no other existing means by or through organizational charter or constitution to do so."

The members of the Student Nominating Board are the President of Mortar Board; the President of Omicron Delta Kappa; a student member of the Graduate School of Arts and Sciences Advisory Council; and one representative from each of the following: Residence Hall Association, Engineers' Council, Joint Committee of Faculty and Students, Student Bar Association, and Association of Medical Students.

THE PROGRAM BOARD

The University Program Board, through its student committee structure and membership, provides a variety of cultural, social, and recreational programs on campus. As a result, students are afforded opportunities to broaden their educational experiences by developing and participating in those programs which contribute to the life of the University community.

Student membership on the Program Board is composed of four executive officers (Chairperson, Vice Chairperson, Secretary, Treasurer) elected from the general student body in the spring semester, and five committee chairpeople appointed after that election. The seven committees of the Program Board are the Art Gallery Committee, Concert Committee, Film-Video Committee, Performing Arts Committee, Public Affairs Committee, Public Relations Committee, and Special Programming Committee. These students work with appointed faculty members and professional staff from the Division of Student Affairs in carrying out their many programs and activities.

THE ENGINEERS' COUNCIL

The Engineers' Council is the student governing body for the School of Engineering and Applied Science, composed of elected representatives from each level class and from the graduate student body, from each student organization in the School, and the House Manager of the Davis-Hodgkins House. The purpose of the Council is to provide liaison between the student body of the School and the Faculty, Administration, and Student Government of the University in all matters affecting the general interests and welfare of the student body, the School, or the University. The Council is maintained financially by the Engineers' Council fee paid by each student in the School, and sponsors the Engineers' Mixers and the Engineers' Ball. Council meetings are open to all students in the School.

STUDENT ORGANIZATIONS

The following is a representative list of organizations active at the University during 1973–74 of particular interest to students in the School of Engineering and Applied Science. More complete information on these and other organizations is available at the Student Activities Office.

HONOR SOCIETIES

Sigma Xi.—A national scientific honor society, the purpose of which is to encourage original investigation in science, pure and applied. Outstanding graduate students in the sciences are eligible for full membership, and undergraduates who have shown marked ability in research may be elected to associate membership.

Delphi.—An intersorority honorary society.

Delta Sigma Rho-Tau Kappa Alpha.—A national forensic society.

Mortar Board.—A national society for juniors and seniors, stressing leadership, scholarship, and service.

Omicron Delta Kappa.—A national society emphasizing leadership in extracurricular activities.

Phi Eta Sigma.—A national society, established to encourage and reward high scholarship and attainment, membership in which is limited to those freshmen who attain a scholastic average of at least 3.50 or the equivalent.

Sigma Tau.—A national engineering honorary fraternity, the purpose of which is to recognize scholarship and professional attainment.

Tau Beta Pi.—A national engineering honorary fraternity, the purpose of which is to recognize distinguished scholarship and exemplary character.

INTERNATIONAL AND CULTURAL EXCHANGE ORGANIZATIONS

Caravansary International, Indian Cultural Association, International Students' Society, Korean Students Association, Organization of Arab Students, Students International Meditation Society, Wah Geo Club.

PERFORMING ARTS

Art Gallery Committee of the Program Board; Cherry Pie Film Festival; Con-

cert Committee of the Program Board; George Washington University Dance Company; Performing Arts Committee of the Program Board, University Chamber Choir, Chorus, Orchestra; University Players. A variety of programs is presented by these groups throughout the academic year.

POLITICAL ORGANIZATIONS

GW College Young Republicans, GW Young Democrats, GWU Ripon Society, Political Affairs Committee of the Program Board, Young Americans for Freedom, Young Socialist Alliance.

PROFESSIONAL ORGANIZATIONS

American Society of Civil Engineers (Student Chapter).
American Society of Mechanical Engineers (Student Chapter).
Institute of Electrical and Electronic Engineers (Student Chapter).
Theta Tau (Gamma Beta Chapter).—A national professional (engineering) fraternity. Membership by invitation to outstanding students who have completed successfully at least the first year in the School of Engineering and Applied Science.

PUBLICATIONS AND COMMUNICATIONS

GW Forum (student-faculty journal), *The Cherry Tree* (the yearbook), *Potomac Review* (publication of Consortium graduate students), *The Rock Creek* (literary magazine), *Student Directory*, *This Month* (monthly listing of major cultural events in the Washington area), *This Week* (weekly list of scheduled events), *The University Hatchet* (semi-weekly newspaper), *Where to Go Guide* (shops, stores, and services in the campus area), WRGW (University radio station).

RELIGIOUS ORGANIZATIONS

Baptist Student Union, B'nai B'rith Hillel Foundation, Christian Science Organization, Eastern Orthodox Club, Lutheran Student Association, Newman Foundation, Nichiren Sho Shu Study Academy, Religious Society of Friends, Satsang, Unitarian-Universalist Club, United Christian Fellowship, Wesley Foundation.

SERVICE ORGANIZATIONS

Circle K, Ecology Action, Freedom Shore Experience, GW Day Care Committee, GW Medical Aid, Project Share, RAP-ID RESCUE, St. Elizabeths Hospital Project, SERVE, Student Volunteer Action Council.

SOCIAL FRATERNITIES

Delta Tau Delta, Kappa Sigma, Phi Sigma Delta, Sigma Alpha Epsilon, Sigma Chi, Sigma Nu, Sigma Phi Epsilon, Tau Kappa Epsilon.

SOCIAL SORORITIES

Delta Gamma, Kappa Alpha Theta, Kappa Kappa Gamma. A Panhellenic Council consists of representatives of all sororities at the University.

SPECIAL INTEREST AND ADVOCATE GROUPS

Black Engineering Society; Black People's Union; Campus Association for Principled Education; Commission on Model Government; D.C. Public Interest Research Group, GW Chapter; Gay People's Alliance; GW Labor Committee; Jewish Activist Front; People's Union; Student/Faculty Union for an Open University; Student Mobilization Committee; Women's Liberation.

SPORTS, HOBBIES, RECREATIONAL ORGANIZATIONS

Ananda Marga Yoga Society, Bridge Club, Cheerleaders, Folkdance, GW Amateur Radio Club, GWU Chapter of Yoga Institute of Washington, GWU Grotto, GWU Parachute Club, GWU Rugby Club, Ski Club.

ATHLETICS

The University is a member of the National Collegiate Athletic Association and the Eastern College Athletic Conference. Its teams participate against the major universities throughout the Midwest and eastern seaboard. The intercollegiate program is comprised of basketball, baseball, soccer, tennis, golf, wrestling, rifle, crew, and cross country.

The University offers a broad program of intramural sports activities for both men and women through the Department of Physical Education, Health, and Recreation.

MAJOR PROGRAM EVENTS

Art Exhibits.—The work of locally, nationally, and internationally known artists is shown in monthly exhibits in the Dimock Gallery in Lisner Lounge and in the art gallery of the Cloyd Heck Marvin Center. With the cooperation of the Curator of Art, an annual student art exhibit is presented.

Concert Series.—The Department of Music presents an artist concert series of five concerts each year.

Orchestra and Concert Series.—The University Orchestra and Chorus are two facets of the lively arts available to students either as credit courses or as extracurricular activities. The Chorus presents major performances to the University community four or five times a year, including regular Christmas and Spring concerts. The University Orchestra presents four or five concerts a year.

Program Board Series.—The University Program Board sponsors concerts each semester at which nationally known entertainers perform.

Recreation Program.—The University Recreation Association and the Department of Physical Education, Health, and Recreation arrange a wide variety of sports and recreational activities and special events for all students.

Theatre.—The Drama Department produces seven major plays during the year on the new proscenium/thrust stage in the Dorothy Betts Marvin Theatre in Lisner Auditorium. Several original and experimental plays are produced in the Experimental Theatre. Students have the opportunity to participate in all aspects of theatre and may receive credit toward their B.A. or M.F.A. degrees for some of their production work.

THE UNIVERSITY

HISTORY AND ORGANIZATION

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington whose name it bears is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a National University in the Federal City. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "that persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets and extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. Within a few blocks are the White House, the Department of the Interior, the State Department, the World Bank, and many other government offices and international agencies. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine and Health Sciences, Engineering and Applied Science, Education, Government and Business Administration, and Public and International Affairs; the College of General Studies; the Division of University Students; the Division of Experimental Programs; and the Summer Sessions.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

THE UNIVERSITY LIBRARIES

The Library collections of the University are housed in the University Library, the general library of the University, and in the departmental libraries of law and medicine.

These collections contain approximately 600,000 volumes, to which are added some 35,000 volumes a year. Endowments, supplementing the University appropriation, provide books in the fields of American civilization, American literature, foreign service, history, public finance, and the social sciences; and gifts from many sources have enriched the collections. The Libraries currently receive 6,000 periodicals.

Information concerning the use of the Libraries may be obtained at the Library service desks.

The Library is administered for the curricular, reference, and recreational needs and interests of the students. Instruction in the use of the library is given upon request by the reference librarians. The Libraries endeavor to assist students and all members of the University to use the rich library resources of Washington and the unusual opportunities they offer for extensive research. Interlibrary loan arrangements are maintained with other libraries in the city and throughout the United States.

The student has access to the Library of Congress, the Public Library of the District of Columbia and its branches, the libraries of the Pan American Union, the Bureau of Railway Economics, the U.S. Department of Agriculture, the Smithsonian Institution, the National Library of Medicine, and many of the other great special collections of the government departments. Full-time graduate students at George Washington University may, upon application, be issued a Consortium library card which permits direct borrowing from the libraries of the other Consortium institutions.

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APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of

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* The University Senate has been renamed the Faculty Senate.

† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The George Washington University as soon after order is restored as is practicably possible.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

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* Amended January 18, 1973.

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

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NATIONAL LAW CENTER, Dean of the Center

SCHOOL OF ENGINEERING AND APPLIED SCIENCE, Dean of the School

UNDERGRADUATE AND GRADUATE CATALOGUE (Arts and Sciences, Education, Government and Business Administration, Public and International Affairs), Office of Admissions

SCHOOL OF MEDICINE AND HEALTH SCIENCES, Admissions Office, School of Medicine and Health Sciences

SUMMER SESSIONS CATALOGUE, Dean of the Summer Sessions

SCHEDULE OF CLASSES: FALL AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.Forens.S.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S. in Forens.S.), Master of Science in Special Studies (M.S. in Sp. Std.), and Doctor of Philosophy (Ph.D.).

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.), Bachelor of Science in Allied Health Science (B.S. in A.H.S.), Bachelor of Science in Environmental Health (B.S. in Env.Health), Bachelor of Science in Medical Technology (B.S. in Med.Tech.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

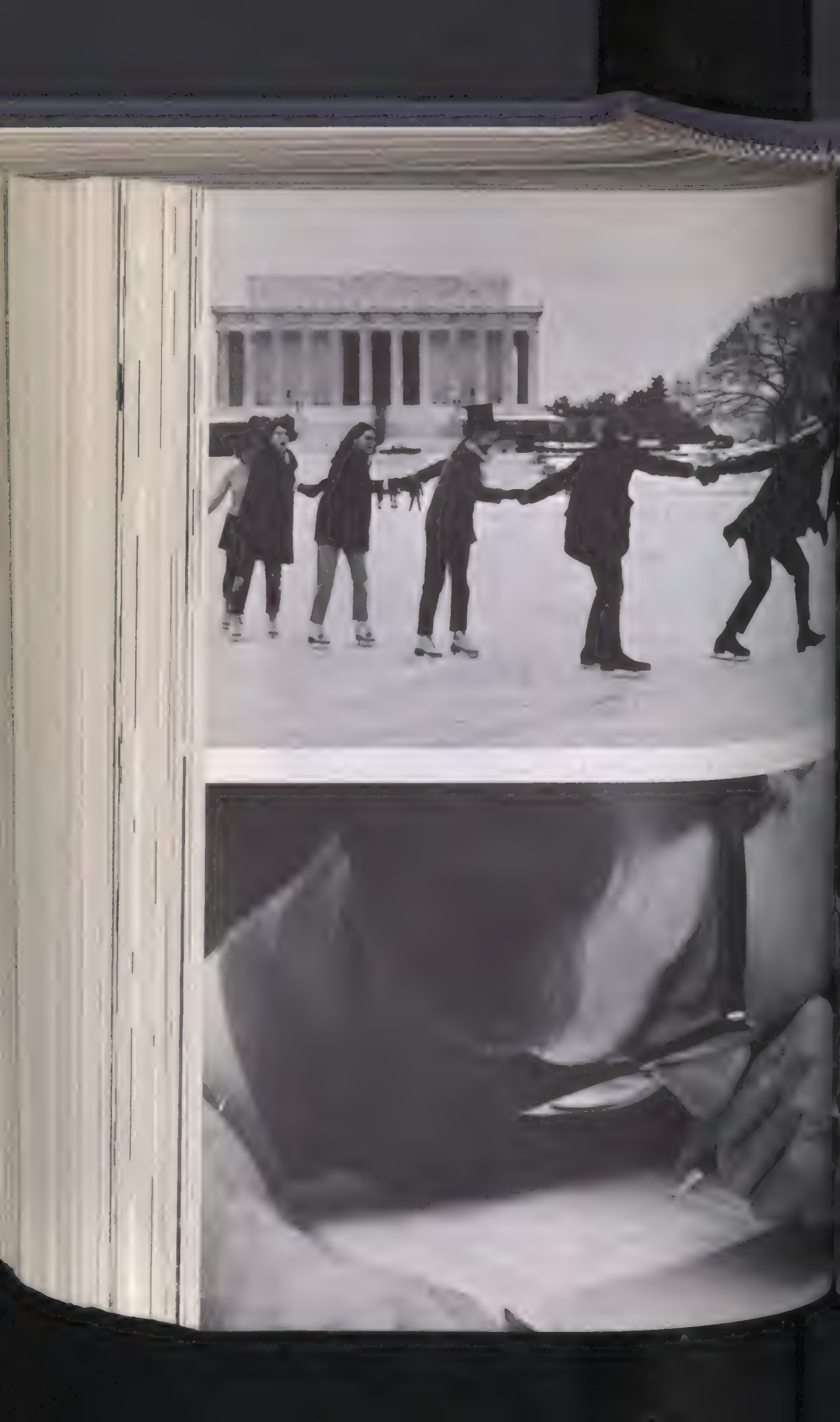
SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), and Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed.), Bachelor of Science in Physical Education (B.S. in P.E.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.) and Master of Arts (M.A.)

4/74—Cornelius—20M



FACTS ABOUT GEORGE WASHINGTON UNIVERSITY

General Information	Private, nonsectarian, coeducational, founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of Students	15,359 (9,694 men, 5,665 women)
Number of Undergraduates	5,173 (2,904 men, 2,269 women)
Geographical Origin of Students	50 states, District of Columbia, 101 countries
Number of Full-time Faculty	875 (78% with Doctoral degrees)
Number of Part-time Faculty	308 (includes some of the most distinguished men in Washington who serve as professorial lecturers)
Residence Hall Space	1,820

Undergraduate majors: Accounting, Allied Health Science (Physician's Assistant), American Civilization, American Literature, Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology, Botany, Business Administration, Cartography, Chemistry, Chinese Language and Literature, Chinese Studies, Civil Engineering, Classical Archaeology and Anthropology, Classical Archaeology and Classics, Classical Humanities, Dramatic Art, Economics, Electrical Engineering, Elementary Education, English Literature, Environmental Health, Environmental Studies, Fine Arts, French Language and Literature, Geodesy, Geography, Geology, Germanic Languages and Literatures, History, International Affairs, Journalism, Judaic Studies, Latin, Latin American Studies, Mathematical Statistics, Mathematics, Mechanical Engineering, Medical Technology, Music (Applied, History and Literature, Theory), Oceanography, Philosophy, Physical Education, Physics, Political Science, Premedicine, Psychology, Public Affairs, Religion, Russian Language and Literature, Russian Literature and Culture—in Translation, Secondary Education, Sociology, Spanish American Literature, Spanish Language and Literature, Speech Communication, Speech Pathology and Audiology, Urban Affairs, Zoology.

Study leading to graduate or professional degrees is offered in the Graduate School of Arts and Sciences, the National Law Center, the School of Medicine and Health Sciences, the School of Engineering and Applied Science, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs.



RGE WASHINGTON UNIVERSITY CAMPUS / WASHINGTON, D.C.

THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1916

THE UNIVERSITY HOSPITAL, 1898

THE DIVISION OF EXPERIMENTAL PROGRAMS, 1973

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COLLEGE OF GENERAL STUDIES

1974-1975

COLLEGE OF GENERAL STUDIES'
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1950-1975



OFF-CAMPUS LOCATIONS OF THE COLLEGE OF GENERAL STUDIES

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THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE COLLEGE OF GENERAL STUDIES 1974–1975

WASHINGTON, D.C. 20006

From the Dean's Desk



The College of General Studies provides an important link between the academic divisions of the University and the community at large. Charged with responsibility for extending the resources of the University through off-campus programs, the College is in a position to bring together the interests of both. The task of delivering programs at widely dispersed locations and processing several thousand students each semester receives our constant attention. In order to provide efficient service, we have recently considered a computerized registration and scheduling system, new procedures for book orders, and methods for minimizing course cancellations. Another major part of our work is program development—working out new responses to the educational needs of the adult part-time student. We are constantly evaluating new ventures, drawing together resources for new programs, and, finally, supporting these programs with the services needed to maintain educational centers at some distance from the central campus. We often find ourselves in the role of a catalyst, providing the stimulus needed to combine the interests of those seeking educational opportunities and those able to provide them into an educational experience that has genuine value to both the student and his community. The past year has seen progress in developing accelerated programs for Associate degree candidates, introducing the Servicemen's Opportunity College and the Government Employees' Opportunity Program which provides increased recognition for nontraditional studies, and building new interdisciplinary designs for special studies graduate degrees. We always welcome new ideas. Some proposals may not be economically feasible; some may be more appropriate to other universities. Many worthwhile proposals, however, become permanent programs, and you will find that we will not turn down an idea simply because it has never been tried before.

Eugene R. Magruder
Dean
College of General Studies

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THE CALENDAR 1974–75*

AUGUST 1974

S	M	T	W	T	F	S
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4	5	6	7	8	9	10
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SEPTEMBER 1974

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OCTOBER 1974

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NOVEMBER 1974

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DECEMBER 1974

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JANUARY 1975

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JUNE 1975

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JULY 1975

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27	28	29	30	31		

1974	**FALL SEMESTER**
August 13–31	Long Session and First Short Session off-campus registration † (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes*) Application for February graduation due as part of registration
‡*August 29–31*	Registration on campus † *Thursday–Saturday* Application for February graduation due as part of registration
September 2	Labor Day (holiday) *Monday*
September 3	Classes begin on campus *Tuesday*
September 3	Long Session, First Short Session, and School of Engineering and Applied Science off-campus classes begin *Tuesday*
October 14	No off-campus classes *Monday*

* Off-campus courses organized at any time.

† Application for Master's Comprehensive Examinations is the student's responsibility and must be made when registering for last courses required for degree.

‡ Hours of registration will be announced in the Campus *Schedule of Classes*.

October 16–28	Second Short Session off-campus registration * (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes*) Application for February graduation, if not filed previously, due as part of registration
†*October 23*	Last day of First Short Session off-campus fall-semester classes *Wednesday*
October 28	No off-campus classes *Monday*
October 29	Second Short Session off-campus classes begin *Tuesday*
November 19	D.Sc dissertations of February candidates due *Tuesday*
November 22–23	M.S. in Adm. Comprehensive Examinations *Friday-Saturday*
November 27	Thanksgiving recess begins after last class *Wednesday*
December 2	Classes resume *Monday*
December 2	School of Engineering and Applied Science Master's theses of February candidates due in Dean's Office *Monday*
December 3	Last day of campus fall-semester classes and School of Engineering and Applied Science off-campus classes *Tuesday*
December 7	M.A. in Ed. Comprehensive Examinations *Saturday*
December 9–18	Campus examination period and School of Engineering and Applied Science off-campus examination period *Monday-Wednesday*
December 16	Last day of Long Session off-campus fall-semester classes *Monday*
December 16–20	Off-campus examination period for Long Session *Monday-Friday*
†*December 17*	Last day of Second Short Session off-campus fall-semester classes *Tuesday*
January 2	Master's theses (other than those in the School of Engineering and Applied Science) of February candidates due in Dean's Office *Thursday*

1975 SPRING SEMESTER

January 2–11	Long Session and First Short Session off-campus registration * (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes*) Application for May graduation due as part of registration
‡*January 9–11*	Registration on campus * *Thursday-Saturday* Application for May graduation due as part of registration
January 13	On-campus classes and School of Engineering and Applied Science off-campus classes begin *Monday*
January 20	Long Session and First Short Session off-campus classes begin *Monday*

*Application for Master's Comprehensive Examinations is the student's responsibility and must be made when registering for last courses required for degree.

†Off-campus final examination may be given at the last class meeting.

‡Hours of registration will be announced in the Campus *Schedule of Classes*.

February 17	Winter Convocation (holiday) *Monday*
March 4–14	Second Short Session off-campus registration * (days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes)* Application for May graduation, if not filed previously, due as part of registration
†*March 5*	Last day of First Short Session off-campus spring-semester classes *Wednesday*
March 8	Spring recess begins after last class *Saturday*
March 17	Classes resume *Monday*
March 17	Second Short Session off-campus classes begin *Monday*
March 18	D.Sc. dissertation of May candidates due *Tuesday*
April 4	School of Engineering and Applied Science Master's theses of May candidates due in Dean's Office *Friday*
April 11–12	M.S. in Adm. Comprehensive Examinations *Friday-Saturday*
April 14	M.S. in Adm. theses of May candidates due in Dean's Office *Monday*
April 18	Last day of campus spring-semester classes and School of Engineering and Applied Science off-campus classes *Friday*
April 19	M.A. in Ed. Comprehensive Examinations *Saturday*
April 24–May 3	Campus examination period and School of Engineering and Applied Science off-campus examination period *Thursday-Saturday*
April 28	Last day of Long Session off-campus spring-semester classes *Monday*
†*April 29–May 6*	Off-campus examination period for Long Session *Tuesday-Tuesday*
†*April 29*	Second Short Session off-campus spring-semester classes end *Tuesday*
May 4	Commencement *Sunday*

1975 SUMMER SESSIONS

There are two six and one-half-week sessions and one thirteen-week session. Days of registration and beginning classes will be announced in the *Off-campus Schedule of Classes.*

* Application for Master's Comprehensive Examinations is the student's responsibility and must be made when registering for last courses required for degree.

† Off-campus final examination may be given at the last class meeting.

THE UNIVERSITY

ISTORY

EORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbian llege in the District of Columbia. The name of the institution was changed 1873 to Columbian University and in 1904 to The George Washington niversity. The debt of the University to George Washington, whose name it ears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted on the establishment of a National University in the Federal City. There he oped that, while being instructed in the arts and sciences, students from all rts of the country would acquire the habits of good citizenship, throwing off cal prejudices and gaining at first hand a knowledge of the practice, as well the theory of republican government. To further the materialization of his pes, Washington left a bequest of fifty shares of The Potomac Company owards the endowment of a University to be established within the limits of e District of Columbia, under the auspices of the General Government, if t government should incline to extend a fostering hand towards it." The ongress never extended "a fostering hand." The Potomac Company passed t of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great ssionary urge and the need for a learned clergy, a group of dedicated min- ers and laymen sponsored a movement for the establishment of a college in e District of Columbia. Inspired largely by the zeal and energy of the Rev- nd Luther Rice, they raised funds for the purchase of a site and petitioned ongress for a charter. After much delay and amendment, Congress granted a arter which was approved by President Monroe on February 9, 1821. To safe- rd the College's nonsectarian character it provided "That persons of every ligious denomination shall be capable of being elected Trustees; nor shall any rson, either as President, Professor, Tutor or pupil, be refused admittance o said College, or denied any of the privileges, immunities, or advantages reof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, activities were centered on College Hill, a tract of forty-six and a half acres tween the present Fourteenth and Fifteenth Streets extending north from rida Avenue to somewhat beyond Columbia Road. The Medical School was ated downtown. For the better part of the Columbian University period, buildings of the University were situated along H Street between Thirteenth d Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom" between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area is not without its reminders of historic interest to the University. President Monroe, who signed the charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

THE COLLEGES, SCHOOLS, AND DIVISIONS

George Washington University includes twelve colleges, schools, and divisions as follows:

*Columbian College of Arts and Sciences** offers four-year programs in the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. The College also provides prelegal and premedical programs, and the preprofessional work required for admission to the School of Education and to the School of Public and International Affairs. Columbian College has academic jurisdiction over the off-campus programs leading to the degrees of Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Geodetic and Cartographic Science, and Bachelor of Science in Oceanography. These off-campus programs are administered by the College of General Studies.

The Graduate School of Arts and Sciences† offers advanced study and research leading to the degrees of Master of Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Forensic Sciences, Master of Music, Master of Science, Master of Science in Forensic Science, Master of Science in Special Studies, Master of Science for Teachers, and Doctor of Philosophy. The degrees of Master of Arts in Special Studies and Master of Science in Special Studies are also available through off-campus programs administered by the College of General Studies.

The School of Medicine and Health Sciences†† offers work leading to the degree of Doctor of Medicine. The School is also offering programs of study leading to the undergraduate degrees of Associate in Science and Bachelor of Science.

The National Law Center‡ offers courses leading to the degrees of Juris Doctor, Master of Laws, Master of Comparative Law, Master of Comparative Law (American Practice), and Doctor of Juridical Science; and special programs in Continuing Legal Education.

The School of Engineering and Applied Science offers courses leading to the degree of Bachelor of Science in the following areas: Civil Engineering, Electrical Engineering, and Mechanical Engineering. Graduate programs lead to

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* Columbian College of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Bachelor of Arts and Doctor of Medicine.

† The Graduate School of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Master of Science and Doctor of Medicine and a dual program leading to the degrees of Doctor of Medicine and Doctor of Philosophy.

‡ The National Law Center cooperates with the School of Public and International Affairs in offering a program leading to the combined degrees of Juris Doctor and Master of Arts.

the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. The School has academic jurisdiction over the off-campus programs leading to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. These off-campus programs are administered by the College of General Studies.

The School of Education offers undergraduate programs leading to the degrees of Bachelor of Arts in Education and Bachelor of Science in Physical Education; graduate studies leading to the degrees of Master of Arts in Education, Master of Arts in Teaching, Education Specialist, and Doctor of Education. The degree of Master of Arts in Education is also available through off-campus programs administered by the College of General Studies.

The School of Government and Business Administration offers undergraduate programs leading to the degrees of Bachelor of Business Administration and Bachelor of Science in Health Care Administration; graduate programs leading to the degrees of Master of Arts in Government, Master of Arts in Health Care Administration, Master of Business Administration, Master of Public Administration, Master of Urban and Regional Planning; the Post-Master's Graduate Certificate in Health Care Administration; the degrees of Doctor of Business Administration and Doctor of Public Administration. The School also has academic jurisdiction over off-campus programs leading to the degrees of Bachelor of Science in Administration and Master of Science in Administration. These off-campus programs are administered by the College of General Studies.

*The School of Public and International Affairs** offers undergraduate programs leading to the degree of Bachelor of Arts and graduate programs leading to the degree of Master of Arts.

The College of General Studies supplements the adult education program of the University through campus and off-campus study; conferences, seminars, and special projects; and continuing education and noncredit programs. This College also administers the off-campus programs over which Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Engineering and Applied Science, the School of Education, the School of Government and Business Administration, and the School of Medicine and Health Sciences have academic jurisdiction.

The Division of University Students makes available courses for students not candidates for degrees in this University.

The Division of Experimental Programs.

The Summer Sessions.

ACADEMIC STATUS

George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

The School of Education is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education for its Bachelor's and Master's degree programs.

* The National Law Center cooperates with the School of Public and International Affairs in offering a program leading to the combined degrees of Juris Doctor and Master of Arts.

The School of Government and Business Administration has maintained full membership in the Middle Atlantic Association of Colleges of Business Administration since 1961. It joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of the American Assembly of Collegiate Schools of Business. The programs in Public Accounting designed to prepare students for Certified Public Accountants examinations have been approved by the state boards of New York and of Maryland. The program in Hospital Administration is accredited by the National Accrediting Commission on Graduate Education for Hospital Administration. The Department of Chemistry is on the approved list of the American Chemical Society. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The program in speech pathology and audiology is accredited by the Education and Training Board of the American Boards of Examiners in Speech Pathology and Audiology.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the United States Information Agency, the Corcoran Gallery of Art, the Department of State, the Department of the Interior, the General Services Administration, the National Academy of Sciences, and the John F. Kennedy Center for the Performing Arts.

GOVERNMENT

The University is privately endowed and is governed by a self-perpetuating Board of Trustees, with the President of the University as an ex officio member. The members of the Board are named for a period of three years and are divided into three classes. The members of one class are elected at each annual meeting to fill the places of the members whose terms of office expire. Two members of each class are nominated by the Alumni Association.

THE GENERAL ALUMNI ASSOCIATION

The objectives of this Association are to unite the graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the University and who have left the University in good standing, or any person who is or has been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those who are life members of the George Washington University General Alumni Association or the Alumni Association of any school of the University, or are current contributors to the George Washington University Fund.

The Alumni Office is located in Alumni House, 714 21st Street, N.W., Washington, D.C. 20006.

All alumni are urged to keep the Alumni Office informed of changes of address or occupation and to supply information with regard to their fellow alumni.

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Associate Deans C.M. Chambers, A.C. Jensen
Assistant Dean Ruth H. Osborn

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INTRODUCTION

The College of General Studies, the off-campus division of George Washington University, was established in 1950 to extend the educational resources of the University to the community. The College continues in expanding the University's activities by providing academic programs for adult students and by helping to meet the continuing educational requirements of the National Capital area.

The College offers off-campus credit courses for the nondegree student, whether for personal enrichment or for updating or upgrading his professional credentials. Off-campus degree programs, administered by the College of General Studies for other colleges and schools of the University, are offered at the



ndergraduate and graduate levels for students who wish to pursue a more ormal program of study. Experimental pilot programs of study are developed n cooperation with other colleges and schools of the University in response to pecific needs of the government and business community. The College also evelops and conducts noncredit courses, seminars, and workshops drawing on he resources of the University.

The Staff of Instruction for the off-campus programs includes members of he full-time faculty of the University and academically qualified part-time lec- urers from the Washington professional community.

The College works closely with education directors, public school officials, nd personnel administrators in government, business, and industry to develop ourses of study and expand the educational opportunities for the mature stu- ent. In cooperation with these sponsoring groups the College offers courses at ff-campus centers throughout the District of Columbia and in nearby Maryland nd Virginia. Government agencies and installations, business organizations, or rofessional groups interested in having the College organize and conduct a ourse or a comprehensive educational program should contact the Associate ean of the College of General Studies.

CADEMIC STATUS

he academic standards of the University are maintained in off-campus credit ourses.

The College of General Studies is accredited by its regional accrediting gency, the Middle States Association of Colleges and Secondary Schools.

EGREE PROGRAMS

olumbian College of Arts and Sciences offers the following degrees off cam- us:

Associate in Arts in General Studies
Bachelor of General Studies
Bachelor of Science in Geodetic and Cartographic Science
Bachelor of Science in Oceanography

e Graduate School of Arts and Sciences offers the following degrees off mpus:

Master of Arts in Special Studies
Master of Science in Special Studies

e School of Engineering and Applied Science offers the following degrees campus:

Master of Engineering Administration
Master of Science
Doctor of Science

e School of Education offers the following degree off campus:

Master of Arts in Education

e School of Government and Business Administration offers the following grees off campus:

Bachelor of Science in Administration
Master of Science in Administration

e School of Medicine and Health Sciences offers the following degree off mpus:

achelor of Science

SPECIAL CREDIT PROGRAMS AND NONDEGREE PROGRAMS

SPECIAL CREDIT PROGRAMS

To encourage participation in foreign-tour programs and continuing educatio throughout life, courses designed to meet needs of interested individuals, group and agencies are offered in the liberal arts, education, and other areas. Fo further information contact one of the persons listed below.

NONDEGREE PROGRAMS

Courses, conferences, seminars, and institutes are offered to meet the needs o individuals and groups. They are designed for business, industry, and profes sional groups. For further information contact one of the persons listed below For information on programs in a general area, contact Charles Chambers, As sociate Dean of the College of General Studies, for Planning and Developmen telephone 676-7070.
For information on programs in allied health, contact Earl Ross, Coordinator of Allied Health Sciences, telephone 676-2632.
For information on LEEP programs, contact Richard C. Allen, telephone 67 7390.
For information on programs concerning women, contact Ruth Osborn, Assis ant Dean of the College of General Studies, for Continuing Education for Women, telephone 676-7036.
For information on Teacher's Programs, contact the geographic area director (see below).
For information on programs in specific geographic areas, contact Ralph De Belles, Director of District of Columbia Programs, telephone 676-7061; Douglas Carter, Director of Maryland Programs, telephone 676-7022; John Morrow, Director of Virginia Programs, telephone 676-7040.

Admission

NO STUDENT may be denied admission to the University because of sex, race color, creed, or national origin.

NONDEGREE STUDENTS

Off-campus credit courses may be taken by nondegree students who mee the prerequisites prescribed by the department concerned. A student who has been dismissed or required to withdraw from this or another institution is not eligible to register for at least one fall or one spring semester from the date of such action. Formal University admission is not required for registration.

Nondegree students wishing to enroll in graduate courses other than those offered by the School of Government and Business Administration must have completed a Bachelor's degree, or have 90 semester hours of undergraduate work and the permission of the instructor. Nondegree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

Credits earned as a nondegree student may later be transferred to degree programs at George Washington University or other colleges and universities, providing they are applicable to the desired curriculum, providing the student meets the requirements of the degree program for which he is applying, and providing all other requirements of the appropriate school are met.

ADMISSION AS A DEGREE CANDIDATE

Students wishing to be admitted as candidates for one of the off-campus undergraduate or graduate degree programs of George Washington University may obtain application forms from the College of General Studies, one of the University's representatives of the Off-campus Credit Programs, or the Education Officer of his agency or installation. For information on the procedure to be followed when applying for admission to campus degree programs, refer to the appropriate catalogue of George Washington University.

An application for admission, required credentials, and a nonrefundable application fee* of $10 (for undergraduate study) or $25 (for graduate study) should be sent to the appropriate office.

Records presented become the property of the University and *cannot* be returned.

UNDERGRADUATE DEGREE CANDIDACY

Completed application, required credentials, and the application fee should be sent to the Office of Admissions, George Washington University, 2121 Eye Street, N.W., Washington, D.C. 20006.

Secondary school graduates applying for Associate in Arts in General Studies or Bachelor's degree candidacy must present the combined evidence of (1) an acceptable certificate of graduation from an accredited secondary school, showing a minimum of fifteen "units"† in a college preparatory or academic curriculum; (2) the principal's statement that the applicant is adequately prepared to undertake college work with reasonable prospect of success; (3) College Entrance Examination Board scores on the Scholastic Aptitude Test and the English Composition Achievement Test (for students out of high school several years, other appropriate tests may be prescribed). The College Entrance Examination Board tests are preferred; however, the American College Testing battery scores will be accepted. The applicant should request that these scores be sent to the Office of Admissions directly from the Educational Testing Service, Princeton, N.J., or Berkeley, Calif.; or from the American College Testing Program, Iowa City, Iowa.

Applicable only to Columbian College of Arts and Sciences and the School of Medicine and Health Sciences.—Mature students who do not meet the above requirements may be considered for degree candidacy after the satisfactory completion of at least 15 semester hours of course work with a grade-point average

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*The application fee must be by check or postal money order, payable to George Washington University.

The application fee is waived for a student applying for readmission who was registered as a degree candidate at the time of his last registration at this University and has not since registered at another institution.

†A unit represents a year's study in a secondary school subject, including in the aggregate no less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

of 2.50 or better. This must include courses in English Composition (Engl 9 or 10 and 11), and 9 semester hours of course work in at least two of the following appropriate areas: Humanities (literature, philosophy, foreign languages), Social Studies (anthropology, economics, geography, history, political science, psychology, sociology), Natural and Mathematical Sciences.

The selection of qualifying courses should be made in conference with the faculty adviser, and a conference concerning plans for study is required of each applicant for admission to candidacy.

Applicable only to the School of Government and Business Administration—Students who have been out of secondary school for three years or more and who do not meet the above requirements may be considered for degree candidacy after the satisfactory completion of at least 15 semester hours of course work with a quality-point index of 2.50 or higher. This must include courses in English Composition (Engl 9 or 10 and 11), and 9 semester hours of course work selected from the first-year curriculum of the Bachelor of Science in Administration degree program.

The selection of qualifying courses should be made in conference with the faculty adviser. A conference concerning plans for study as a degree candidate is required of each applicant before admission to candidacy.

ADVANCED STANDING AND ADVANCED PLACEMENT

TRANSFER STUDENTS FROM OTHER COLLEGES AND UNIVERSITIES

Properly certified courses taken at accredited colleges or universities may be applied toward a degree, subject to the curriculum requirements of the degree program and the rules of the college or school to which admission is sought.

Although a grade of *D* is not acceptable for transfer, the course may be used to satisfy a curriculum requirement. The *D* grade may not, however, be counted toward the total number of semester hours required for the degree. Any course completed with a grade of *D* or better may not be repeated for the purpose of earning degree credit.

Transfer students whose previous academic records raise doubts of their ability to complete degree requirements successfully must complete 15 hours of course work in this College with a quality-point index of 2.50 or higher, to be considered for degree candidacy. Courses taken to qualify for candidacy must be distributed over two or more of the following areas: Humanities (literature, philosophy, foreign language), Social Studies (anthropology, economics, geography, history, political science, sociology), and Natural and Mathematical Sciences. (Students who have not successfully completed an acceptable college course in English Composition must include Engl 9 or 10 and 11.) Applicants who have been suspended for academic reasons from this University or another institution must fulfill this same 15-hour requirement and also obtain written approval of a petition for admission to degree candidacy from the Committee on Admission and Advanced Standing of Columbian College of Arts and Sciences or from the Dean of the School of Government and Business Administration or from the Associate Dean for Allied Health Programs of the Medical Center.

In no case will more than 60 semester hours of advanced standing be granted for course work completed at a community or junior college to those students planning to enroll in the Bachelor of Science in Administration degree program. Accounting and Business Administration courses taken at such colleges may be

pplied toward the Bachelor of Science in Administration degree provided they e comparable to the School of Government and Business Administration ourses numbered under 100. Courses comparable to B Ad 161, Mgt 118, 119, Stat 97 may also be applied. Other courses (one course per area up to a aximum of three courses), comparable to this School's courses numbered 01–200, taken at an accredited community or junior college where a grade of - or better has been earned may be accepted to waive certain required courses; owever, the waiver of a required course does not entitle the student to any emester hours of credit toward the total 60 semester hours required for the nior or senior years.

The University reserves the right to refuse credit for transfer in whole or in art, or to allow it provisionally. Credit so given may be withdrawn for subequent poor work.

It is the responsibility of the student to have an official transcript sent directly om each institution formerly attended to the Office of Admissions, George ashington University, Washington, D.C. 20006.

If the transcript from a higher institution includes the record of his secondary chool work, it is not necessary for the applicant to have forwarded a separate cord from the principal of the secondary school.

RNING CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

addition to credit allowed in transfer from other accredited colleges or uniersities, a maximum of 30 semester hours of advanced standing may be obined by any one or any combination of the following methods.

A student may earn up to a maximum of 30 hours, or waive curricular requirements without limitation *(passing a waiver examination does not entitle the udent to any semester hours of credit)*, by performing satisfactorily on any or of the following:

Advanced Placement Tests (APT).—Administered by the College Entrance amination Board.

Achievement Tests (may be used to waive requirements only).—Administered by the College Entrance Examination Board.

College-Level Examination Program (CLEP).—CLEP offers two types of exminations: (1) CLEP Subject Examinations* are offered in 29 subject areas. ese tests measure achievement in the equivalent of specific college-level rses. (Credit may not be earned by passing the examination after having en the equivalent course.) (2) CLEP General Examinations—offered in five as: Mathematics, Social Sciences, Humanities, the Natural Sciences, and glish Composition. (Credit—advanced standing—is not given for the Gen- Examination in English Composition.) To be eligible to take the CLEP neral Examinations, a student must have been out of secondary school for ee years or more, and he must not have been enrolled in any regular college ogram during that time.

Special Department Examinations in Columbian College of Arts and Sciences. A student may request any department of Columbian College to offer him a cial examination covering the subject matter of any specific course. (If an

*CLEP examinations in Introductory Accounting, Introduction to Business, Commercial Law, and Data Processing are limited to 3 credits each of advanced standing in the School of Government and Business Administration. All other CLEP examinations in Accounting and Business Administration (School of Government and Business Administration courses) are not accepted for advanced standing.

appropriate CLEP Subject Examination is available, the department may choose to employ it.) If a student performs satisfactorily, he may receive credit (advanced standing), waiver of a requirement, *or both*, at the discretion of the department. (A student who has previously taken examinations to waive course requirements may not, however, at a later time take examinations for credit in the same courses.) Special departmental examinations will normally be of at least three hours' duration. A fee of $25 for each course examination is charged for preparing, administering, and grading.

Service Schools.—A maximum of 30 (or a maximum of 12 hours if the courses are "professional") semester hours may be obtained on the basis of service schools satisfactorily completed, as evaluated in accordance with the *Guide to the Evaluation of Educational Experience in the Armed Forces*. Ordinarily such subjects are counted as electives. No credit will be allowed for military experience as such.

Correspondence Courses.—A maximum of 15 semester hours may be earned through the successful completion of correspondence courses of college level which are offered by the U.S. Armed Forces Institute or a regionally accredited college or university.

Examination for Waiving Curriculum Requirements.—A student wishing to omit a required course may, with the permission of the faculty adviser, take a waiver examination, the passing of which relieves him of the curriculum requirement and qualifies him for registration in an advanced course. The fee for each 3-hour course examination is $5.

Credit Earned Through United States Armed Forces Institute (USAFI).—Except for those students enrolled as candidates for the Bachelor of Science in Administration degree, credit is assigned for approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

GRADUATE DEGREE CANDIDACY

MASTER'S DEGREES

The Degree of Master of Arts in Education (School of Education).—Application for Master's degree candidacy should be made by the time of registration. Completed application, required credentials, and the application fee should be sent to the Office of the Dean, School of Education, 2201 G Street, N.W., Washington, D.C. 20006.

Admission to graduate study toward a Master's degree requires a Bachelor's degree from an accredited institution, an undergraduate quality-point index of 2.50 (a *C* + average) or above, demonstrated interest in teaching, appropriate undergraduate work, and personal traits that show promise as a teacher. Two years of successful teaching are required before admission to candidacy in the field of school administration.

The Degree of Master of Science in Administration (School of Government and Business Administration).—Application for Master's degree candidacy must be made before or at the time of registration for the initial course work. Completed application, required credentials, and the application fee should be sent to the Admissions Officer, School of Government and Business Administration, 710 21st Street, N.W., Washington, D.C. 20006.

The general requirement for Master's candidacy is a Bachelor's degree, including at least 90 semester hours of academic work from a regionally ac-

edited college or university with an over-all quality-point index of 3.00 (a average), adequate undergraduate preparation for the chosen area of concentration, and satisfactory performance on the Admission Test for Graduate tudy in Business*.

The Admission Test for Graduate Study in Business must be taken prior to pplication for degree candidacy or during the semester in which application is ade. For information concerning the date and place for taking the test, con- ct the Educational Testing Service, Box 955, Princeton, N.J. 08540.

No more than 6 semester hours of credit toward the Master's degree will be anted for work taken in nondegree status at this University (before applica- n to this degree program and while the application is being processed).

A maximum of 6 semester hours of advanced standing may be credited oward the degree by transfer of credit for approved graduate work taken at an ccredited college or university. Request for advanced standing must be made the time of application for Master's degree candidacy.

The Degrees of Master of Arts in Special Studies or *Master of Science in pecial Studies (Graduate School of Arts and Sciences).*—These Master's de- ee off-campus programs are arranged for groups of students participating a particular program which has been approved by the Graduate School of rts and Sciences. Application for Master's degree candidacy must be made members of the group before registration. Completed application, required redentials, and the application fee should be sent to the Office of the Dean, raduate School of Arts and Sciences, 2000 H Street, N.W., Washington, C 20006.

Admission to graduate study toward a Master's degree in this School re- uires a Bachelor's degree, from an accredited college or university, with an ver-all quality-point index of 3.00 (a *B* average) or an equivalent grade.

No more than 6 semester hours of credit toward a Master's degree will be anted for work taken in nondegree status at this University.

A maximum of 9 semester hours of advanced standing may be credited oward a Master's degree by transfer of credit for approved graduate course ork taken at an accredited college or university.

The Degrees of Master of Science or *Master of Engineering Administration chool of Engineering and Applied Science).*—Application for Master's degree andidacy *must* be made before registration. Completed application, required redentials, and the application fee should be sent to the Manager of Engineer- g Admissions, School of Engineering and Applied Science, 725 23rd Street, W., Washington, D.C. 20006.

Admission to graduate study toward a Master's degree requires an appropriate achelor's degree from a recognized institution and evidence of capacity for oductive work in the field selected, as indicated by undergraduate grades, raduate Record Examination scores, and similar data.

An applicant who has significant deficiencies in preparation may be required take prescribed undergraduate courses as an unclassified student before ing admitted to graduate student status. In some cases, if such deficiencies e minimal, he may be admitted to graduate student status and allowed to e a limited number of graduate courses while completing the undergraduate urses in which he is deficient. In no case may the undergraduate courses thus en fulfill any part of the requirements for the Master's degree.

*This is a test of general aptitude and does not presume an undergraduate major in Business dministration.

Students wishing to apply for admission to the program of study leading to the degree of Master of Engineering Administration are required to meet the following additional admission requirements: (1) the applicant must have an adequate knowledge of the principles of human relations, the fundamentals of engineering economic analysis, and the fundamentals of quantitative methods. This requirement can be met by satisfactory completion of the following undergraduate courses or approved equivalents: E Ad 150, *Introduction to Technical Management;* E Ad 160, *Introduction to Engineering Economic Analysis;* and E Ad 170, *Basic Quantitative Methods for Engineering Administration.* (2) The applicant may be required to complete other undergraduate prerequisite courses prescribed as a condition of admission. (3) A student is required to earn the grade of *C* or better in these courses (unless the requirement is stipulated to be a grade of *B* or better upon his admission) in each undergraduate prerequisite course. If this scholarship requirement is not met, the student is barred from further enrollment. A student is not permitted to repeat any of the undergraduate prerequisite courses. Credit for prerequisite courses is not applicable toward the degree of Master of Engineering Administration.

Up to 6 semester hours of satisfactory credit (with grades of *A* or *B*), which normally must have been earned in a graduate program at another recognized institution, *may* be accepted in transfer, when applicable, to satisfy Master's degree requirements in the School of Engineering and Applied Science. However, the student must, with the approval of his adviser, petition to the appropriate department chairman for such a transfer.

DOCTOR OF SCIENCE DEGREE

The Degree of Doctor of Science (School of Engineering and Applied Science).—The prospective doctoral student seeking admission should apply before June 1 for the fall semester and before December 1 for the spring semester. Personal interviews may then be arranged to discuss the applicant's qualifications and the possibilities for an effective doctoral program. The applicant must arrange for complete documentary records (transcripts) to be forwarded to the Manager of Engineering Admissions, School of Engineering and Applied Science, 725 23rd Street, N.W., Washington, D.C. 20006, in sufficient time to permit assembly of complete records for evaluation as soon after the above application deadlines as possible.

To be admitted to the doctoral program, a satisfactory Master's degree from an accredited institution is required, together with acceptable personal qualities and a capacity for creative scholarship. Normally, a *B* average in graduate work is required. However, the minimum does not assure automatic acceptance; the departments may, and often do, set higher admission standards. The applicant must arrange for letters of recommendation to be submitted from two faculty members of the institution from which he received his Master's degree, one of these, if possible, should be from his Master's adviser. The letter should be addressed to the appropriate department chairman.

Up to 6 semester hours of credit earned in courses completed with the grade of *A* or *B* while enrolled in a doctoral program at another accredited institution may be accepted in transfer to satisfy doctoral requirements at this School, subject to the approval of the student's adviser and his department chairman. Credit earned in courses completed more than five years prior to admission to the doctoral program will not be accepted in transfer, and some departments

ay require that transfer credit must have been earned within a shorter period f time before admission.

ADMISSION

student who withdraws, is suspended, or is otherwise absent from the Univer- for one semester or more, may re-enter and continue his work only under e rules and regulations in force at the time of his return. Complete and ficial transcripts from each institution the student has attended since making previous application must be sent to the appropriate office at this University fore his application for readmission can be evaluated.

When there are curriculum changes in graduate programs in the School of overnment and Business Administration, the readmitted student may be re- ired to take additional course work in preparation for the Master's Compre- nsive Examinations.

Registration

F-CAMPUS REGISTRATION is conducted before or at the first class meet- of each course, at times and places stated in the *Off-campus Schedule of asses*, available well in advance of each semester.

Registration in an off-campus course *constitutes admission to that course* . It does not admit the student to campus courses or to degree candidacy. ny students admitted to degree candidacy may enroll as full-time students or 12 semester hours or more). Those who have been graduated from high hool recently and wish to be *full-time freshman* students at this University ould apply for admission to the appropriate college or school on campus.

Off-campus degree candidates in an area of concentration with a small enroll- nt which would not justify offering courses off campus may have to register campus courses in order to meet the requirements for the degree.

Auditing.—With the permission of the instructor, students may register as uditors." An auditor is not required to take active part or to take examina- ns; he receives neither grades nor credit. Tuition is the same for the auditor for the student registered for credit. With the approval of the Dean, a dent may change from credit to audit status during the first third of the mester. A student who takes a course as an auditor may not repeat it later credit.

Concurrent Registration.—A student registered as a degree candidate in any her college or school of the University may take credit courses in the College General Studies *only by permission (granted prior to registration) of the an* of the college or school concerned. A "College of General Studies Off- mpus Concurrent Registration Permit" form must be obtained from the propriate college or school, signed by the dean of that college or school, and sented at the time of registration in the College of General Studies.

Service personnel enrolled full time for campus courses need the permission the Dean of the College of General Studies to register concurrently for off- mpus courses.

ny student taking course work in another college or school of the Univer- or at another institution through the Consortium of Universities of the shington Metropolitan Area, Inc., must have the permission of his Dean.

Fees and Financial Regulations

ALL FEES should be paid by check or money order, made payable to Geo... Washington University. The student identification number should appear in ... upper left-hand corner.

The following fees were adopted for the academic year 1974–75. (See page... 26–27 for projected tuition and fee increases for 1975–78.)

Tuition*

On campus:	
Part-time undergraduate program or hours in excess of 18, for each semester hour	$90.0...
Graduate study other than in the School of Engineering and Applied Science, for each semester hour	90.0...
Graduate study in the School of Engineering and Applied Science, for each semester hour	92.0...
Off campus:†	67.0...
For each semester hour	92.0...
School of Engineering and Applied Science off-campus programs, for each semester hour ‡	78.0...
ICAF programs, for each semester hour	78.0...
Thesis:§	
ICAF programs, for each semester hour	90.0...
Master of Arts in Education and Master of Science in Administration degree programs (other than ICAF), for each semester hour	92.0...
School of Engineering and Applied Science programs, for each semester hour‡	

University Center Fee (charged only to students registered on campus, nonrefundable)

For students registered for 11 or more semester hours on campus:	43.0...
For each semester	
For students registered for less than 11 semester hours in a semester on campus:	4.0...
For each semester hour for which the student registers	
For on-campus degree candidates maintaining "continuous registration" status:	4.0...
For each semester	

Special Fees

Application fee (undergraduate degree candidate), nonrefundable	10.0...
Application fee (graduate degree candidate), nonrefundable	25.0...

* Students interested in full-time undergraduate study on campus should consult the appropriate catalogue (*Undergraduate and Graduate Catalogue, School of Engineering and Applied Science* catalogue, or *School of Medicine and Health Sciences* catalogue).

† Except for ICAF and School of Engineering and Applied Science programs.

‡ This fee does not apply to special off-campus programs arranged with the School of Engineering and Applied Science.

§ Payment of tuition for a Master's thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted in accordance with the regulations of the school in which the student is registered. (See page 35 for regulations governing military leave.)

Graduation fee, due and payable at the time of registration for the last semester or summer session:

Associate's degree	$10.00
Bachelor's, Master's, and Doctor of Science degrees	25.00
Special Columbian College of Arts and Sciences departmental examination fee, for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25.00
Continuous Registration fee, *off-campus degree candidates (other than those in the School of Engineering and Applied Science)*, to maintain "continuous registration" during any semester of absence from the University*	67.00
Continuous Registration fee, *on-campus or off-campus†, degree candidates in the School of Engineering and Applied Science*, to maintain "continuous registration" during any semester of absence from the University or after completion of tuition requirements*	92.00
Continuous Registration fee, *ICAF degree candidates*, to maintain "continuous registration" during any semester of absence from the University*	78.00



*Payment of the continuous registration fee entitles the student who is granted leave of absence to return and continue his work toward a degree under the academic requirements which were in force at the time of his first registration. The continuous registration fee applies toward neither tuition fee nor residence requirements for the degree. This fee does not apply to students granted military leave (see page 35).

†This fee does not apply to special off-campus programs arranged with the School of Engineering and Applied Science.

Late-registration fee, for failure to register for campus courses within the designated period	$15.00
Fee for binding two copies of the Master's thesis (other than ICAF programs)	10.00 7.00
Fee for binding two copies of the Master's thesis (ICAF programs)	
Fee for Microfilm Service and Printing Announcement of Final Examination (Doctor of Science candidates)	60.00
Late-payment fee, for failure to make payments when due (see "Payment of Fees," pages 27–28)	15.00
On-campus financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 27–28)	35.00
Off-campus financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 27–28)	15.00
Returned check fee, charged a student whose check is returned because of insufficient funds or improper drafting	15.00 5.00
Fee for each examination to waive a curriculum requirement	2.00
Transcript fee, charged for each transcript of record	

PROJECTED TUITION AND FEE INCREASES 1975–78

Projected increases for the academic years 1975–76, 1976–77, and 1977–78 have been estimated as follows:

On Campus*

† Increase by semester hour (graduate and part-time undergraduate students):

1975–76	$4.00
1976–77	4.00
1977–78	7.00

The University Center fee will be increased for the 1975 summer sessions and for the academic year 1975–76. For students taking 11 or more semester hours, the fee will be $46.50 a semester, an increase of $3.50 Students taking less than 11 semester hours will pay $4.35 a semester hour, an increase of $.35.

Off Campus

† Increase by semester hour (except ICAF and School of Engineering and Applied Science programs):

Course Work Other than Thesis	
1975–76	$3.00
1976–77	4.00
1977–78	4.00

* Students interested in full-time undergraduate study on campus should consult the appropriate catalogue (*Undergraduate and Graduate Catalogue, School of Engineering and Applied Science catalogue*, or *School of Medicine and Health Sciences* catalogue).

† Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

Thesis for Master of Arts in Education and *Master of Science in Administration programs*

1975–76	$4.00
1976–77	4.00
1977–78	7.00

Increase by semester hour (ICAF programs including thesis):

1975–76	3.00
1976–77	4.00
1977–78	4.00

Increase by semester hour (School of Engineering and Applied Science programs including thesis):

1975–76	4.00
1976–77	4.00
1977–78	7.00

Every effort will be made to keep tuition increases within the above limits. However, it is not possible to project future economic data with certainty, and circumstances may require an adjustment of these estimates.

YMENT OF FEES

F-CAMPUS COURSES

es for each semester are due and payable in full at the time of each registration: however, a student registering for a *thirteen-week credit course* may a deferred payment contract at each registration to make payments in three al installments—one-third at the time of registration, one-third by October 974, and one-third by November 5, 1974 (for the fall semester): one-third February 12, 1975, and one-third by March 12, 1975 (for the spring semes-. Payments are due at the stipulated times. Interest at the rate of 8 per cent annum on the unpaid balance will be charged from the beginning of each ester to the date payment is made.

Students receiving partial government tuition assistance must pay their portion of the tuition in full at the time of registration.

Except for specified special sessions, tuition and fees for credit courses lasting less than twelve weeks, and for all noncredit courses, are payable in full at registration.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to an interest charge of eight per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his rights to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settle-

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Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

The increase by semester hour does not include the projected increases for special off-campus programs arranged with the School of Engineering and Applied Science.

ment will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $15.

Students auditing courses are subject to all fees charged to students registered for credit.

CAMPUS COURSES

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full at the Office of the Cashier at the time of each registration. Checks and postal money orders should be made out to George Washington University with student identification number shown in upper left hand corner.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 23, 1974 (for the fall semester), and March 5, 1975 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $600 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his rights to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

REFUND OF FEES FOR OFF-CAMPUS REGISTRATION*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the dean of the college, school, or division in which the student is registered. Notification to an instructor is not an acceptable notice.

* For regulations concerning refunds of fees for students who register for courses on campus, see the *Undergraduate and Graduate Catalogue*, the *School of Engineering and Applied Science Catalogue*, or the *Summer Sessions Catalogue*.

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges will be made in accordance with the following schedule for the academic year (withdrawal dates for the Summer Sessions will be announced in the *Off-campus Summer Sessions Schedule of Classes)*:

Session	*Per cent refund on or before the date listed*			
	90%	75%	50%	None
Fall Semester 1974				
Long Session (Sept. 3–Dec. 16)	Sept. 9	Sept. 23	Oct. 7	After Oct. 7
First Short Session (Sept. 3–Oct. 23)	Sept. 4	Sept. 11	Sept. 18	After Sept. 18
Second Short Session (Oct. 29–Dec. 17)	Oct. 30	Nov. 6	Nov. 13	After Nov. 13
Spring Semester 1975				
Long Session (Jan. 20–April 28)	Jan. 24	Feb. 7	Feb. 24	After Feb. 24
First Short Session (Jan. 20–March 5)	Jan. 21	Jan. 28	Feb. 4	After Feb. 4
Second Short Session (March 17–April 29)	March 18	March 25	April 1	After April 1

Students withdrawing from courses scheduled at times other than those listed above should consult the Student Accounts Office for information concerning refunds.

No exceptions will be made for holidays, late registration, absences, or class rescheduling for any reason whatsoever.

A student who is granted military leave before completing the semester will receive credits for current charges in accordance with the schedule for withdrawals from the University (see above). Payments made in excess of the nonrefundable balance will be refunded to the student. The nonrefundable balance will be maintained as a deferred credit for use by the student when he returns to the University (see "Military Leave," page 35).

No case will tuition be reduced or refunded because of absence from classes. Payment applies only to the semester for which a registration charge is incurred and will not be credited to another semester (exception: students granted military leave, see page 35).

Authorization to withdraw and certification for work done will not be given student who does not have a clear financial record.

Regulations

CAMPUS STUDY

OFF-CAMPUS DEGREE CANDIDATES may register for campus courses approved for their programs if these courses are not available at off-campus centers. Students must notify the Office of Student Records, College of General Studies, telephone 676–7017, at least two weeks prior to the date of campus reg-

istration so that registration materials may be prepared. This material may be picked up by the student at Building K, 817 23rd Street, N.W., during registration.

A student may register for on-campus courses as a nondegree student in the Division of University Students, telephone 676-6370.

ACADEMIC WORKLOAD

Only students admitted to degree candidacy may enroll as full-time students, i.e., for 12 or more hours in a semester. Students taking course work to qualify for degree candidacy who are registered in this College may not take more than 10 hours in a semester.

A full-time undergraduate student in Columbian College of Arts and Sciences who is not on probation may not ordinarily take more than 17 semester hours. A student employed more than 20 hours a week, who is not on probation, may not take more than 10 hours.

A full-time student in the School of Government and Business Administration who is not on probation may not ordinarily take more than 15 semester hours. A student employed more than 24 hours a week, who is not on probation, may not take more than 9 semester hours.

A full-time undergraduate student who is a candidate for a degree in the School of Government and Business Administration and whose quality-point index is 3.50 or higher may not take more than 18 hours. An employed undergraduate student who meets the same standard may not take more than 12 hours.

A full-time undergraduate student who is a candidate for a degree in Columbian College of Arts and Sciences and who, during the immediately preceding semester, has received no grades below *B* and has earned grades of *A* in three courses totaling at least 9 semester hours may take 18 or 19 hours. An employed undergraduate student who, during the immediately preceding semester, has no grades below *B* and has earned grades of *A* in two courses totaling at least 6 semester hours may not take more than 12 hours.

A student on probation normally may not take more than 3 semester hours.

A student who accepts employment after registration or at any time during a semester must report that fact immediately to the Dean so that his program may be adjusted, if necessary.

A full-time graduate student who is a candidate for a degree in the School of Government and Business Administration may not take more than 12 semester hours. A graduate student who is employed more than 20 hours a week may not take more than 6 hours.

A full-time student in the Graduate School of Arts and Sciences registers for 9 to 12 semester hours each semester; a part-time student registers for a minimum of 6 semester hours each semester. These requirements do not apply when a student has fewer than 9 semester hours (full-time) or 6 semester hours (part-time) remaining to complete his program. No more than 15 semester hours may be taken during any one semester.

ATTENDANCE

A student may not attend classes until registration is completed and fees due are paid. He may attend only those classes for which he is registered.

The student is held responsible for all the work of the course in which he is

gistered, and all absences must be excused by the instructor in charge before ovision is made for the student to make up work missed.

CHOLARSHIP

RADES

rades are mailed to the student through the Office of the Registrar at the se of each semester. They are not given out by instructors or the adminis- ative staff.

DERGRADUATE

he following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory; Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal. Except for rses which specifically state that repetition for credit is permitted, a student y not repeat for credit a course in which he has received a grade of *D* or ter, unless required to do so by the department concerned. A written state- nt to this effect must be submitted to the Registrar by the appropriate de- rtmental chairman.

ADUATE

e following grading system is used: *A*, Excellent; *B*, Good; *C*, Minimum de; *F*, Fail; *I*, Incomplete; *CR*, Credit; *W*, Authorized Withdrawal. Except courses which specifically state that repetition for credit is permitted, a dent taking School of Education and School of Government and Business inistration courses may not repeat for credit a course in which he has ived a grade of *C* or above. A student taking a Graduate School of Arts Sciences course may repeat for credit a course in which he has received rade of *C* or above only when permitted to do so by the department con- ed, unless the course description states that the course may be repeated credit. A written statement to this effect must be submitted for approval the Dean's Office. It is then filed with the Registrar. A student taking ool of Engineering and Applied Science courses may not repeat for credit ourse in which he has received a grade of *C* or above, unless required to do by the department concerned; a written statement requiring the student to at such a course for credit must be submitted to the Registrar by the ropriate department chairman.

OMPLETE/AUTHORIZED WITHDRAWAL

never a grade has not been assigned, the symbol *I* (Incomplete) or the bol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates a satisfactory explanation has been given the instructor for the student's re to complete the required work of the course. At the option of the ructor, the grade of *I* may be recorded if a student, for reasons beyond his rol, is unable to complete the work of the course, and if the instructor is rmed of, and approves, such reasons before the date when grades must be rted. The grade may be used only if the student's prior performance and attendance in the course have been satisfactory. Any failure to complete work of a course which is not satisfactorily explained to the instructor

before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, he may initiate an appropriate grade change.

REMOVING AN INCOMPLETE

For information concerning the removal of a grade of Incomplete from a student's record, consult the regulations of the college or school (see pages 46–47, 62, 65, 67, and 75).

QUALITY-POINT INDEX*

Quality points are computed from grades as follows:

For each semester hour of the letter grade—*A*, 4 points; *B*, 3 points; *C*, 2 points; *D*, 1 point; *F*, no points.

Scholarship is computed in terms of the quality-point index. This is done by dividing the total number of quality points by the total number of semester hours for which the student has registered. Example: if a student received an *A* in one three-credit course, and a *B* in another three-credit course, he would compute his quality-point index this way:

$A = 4 \times 3$ (semester hours) $= 12$
$B = 3 \times 3$ (semester hours) $= 9$

6 $21 \div 6 = 3.5$ quality-point index

Courses marked *W, I, CR, or NC* are not considered in determining the index, except that courses marked *I* will be considered when a formal grade is recorded. Grades in courses taken at other institutions are not considered in computing the quality-point index.

WARNINGS

At stated intervals during the academic year students who are doing work of *D* grade or lower in courses with departmental numbers below 100 receive "warnings." A "warning" constitutes notice to the student that he must consult his instructor and his adviser at the earliest opportunity. "Warning periods" are established during the seventh and eighth weeks of thirteen-week courses, and during the third and fourth weeks of six and a half week courses.

PROBATION

Undergraduate Probation in the School of Government and Business Administration and the School of Medicine and Health Sciences.—A student must maintain a quality-point index of at least 2.00 or be placed on probation.

A student who has attempted 12 or more semester hours of work and whose cumulative quality-point index is below 2.00 is placed on probation for the period in which he attempts 12 additional semester hours of work. If his quality-point index is still below 2.00 at the end of his probationary period, he is suspended.

* Not applicable to Columbian College of Arts and Sciences and graduate study in the School of Engineering and Applied Science.

Undergraduate Probation in Columbian College of Arts and Sciences.—A student who is not suspended or on probation is considered to be in good standing. A student* who in one semester receives two grades of *F* in courses carrying 3 or more semester hours of credit each, or the equivalent, is placed on probation. A student in his first semester on probation who receives one grade of *F* in such a course will be continued on probation for a second semester. Two grades of *D* will be treated as equivalent to one grade of *F* in determining probation. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a part of the record for the semester during which the *I* is removed. A student on probation taking 12 or more semester hours whose grades are all C or better is removed from probation.

Graduate Probation in the School of Government and Business Administration.—A student who has attempted 6 or more semester hours and whose quality-point index is below 3.00 is placed on probation for the period in which he attempts 12 additional semester hours of work. If his quality-point index is still below 3.00 at the end of his probationary period, he is suspended. If, after probation is removed, a student's quality-point index again falls below 3.00, he is suspended.

SUSPENSION

Undergraduate Suspension in the School of Government and Business Administration.—A student who has attempted 12 or more semester hours of work and whose cumulative quality-point index is below 1.50 is subject to suspension.

Undergraduate Suspension in the School of Medicine and Health Sciences.—A student whose quality-point index remains below 2.00 after a 12-semester-hour period of probation is suspended.

Undergraduate Suspension in Columbian College of Arts and Sciences.—A student* who in one semester receives grades of *F* in three courses carrying 3 or more semester hours of credit each, or the equivalent, is suspended. A student in his first semester on probation who receives two or more grades of *F* in such courses is suspended. A student who receives one or more grades of *F* in such courses in any later semester on probation is suspended. Two grades of *D* will be treated as equivalent to one grade of *F* in determining suspension. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a part of the record for the semester during which the *I* is removed.

An undergraduate student who is subject to probation for the third time, whether successive or after an interval, is suspended.

An undergraduate student suspended for poor scholarship cannot register for courses even as an auditor. He may apply for readmission after the lapse of either the fall or the spring semester. He must then submit evidence to the Committee on Scholarship that he is better qualified to pursue college work. A student suspended twice for poor scholarship will not be readmitted.

Graduate Suspension in the School of Education.—A student who receives

*The rules governing probation and suspension are applicable as stated to students enrolled for a full-time program (12 semester hours or more) during the fall or spring semester. Students enrolled for less than 12 semester hours during the fall or spring semester and students enrolled during the summer sessions are subject to probation or suspension on the basis of their record for 12 semester hours, or multiples thereof, rather than on their record in any one semester.

the grade of *C* in more than 6 semester hours of work is subject to suspension. A student who receives a grade of *F* must confer with the Dean of the School of Education before enrollment for further work.

CHANGES IN PROGRAM OF STUDIES

DROPPING A COURSE OFF CAMPUS

A course may be dropped without academic penalty *during the first third of the semester.* Withdrawing from a course without academic penalty after the first third of the semester requires approval of a written request, *accompanied by a completed drop slip,* addressed to the Dean of the College of General Studies.

Procedure for Dropping Courses.—An off-campus drop slip (obtainable from the instructor, or University representatives at the College of General Studies) must be completed, signed and dated by the instructor, and submitted to the College of General Studies. The effective date will be the date the instructor signed the drop slip.

Failure to follow the proper procedure will result in the Office of the Registrar recording the grade of *F* and, regardless of the time of discontinuance, will not relieve the student of financial responsibility for the entire course.

DROPPING A COURSE ON CAMPUS

A *campus* drop slip (available at the Office of the Registrar) must be completed, signed and dated by the instructor, and submitted to the Office of Student Records, College of General Studies.

Each college and school of the University sets deadline dates for each semester concerning withdrawal.

All charges for courses dropped without the approval of the dean must be met by the student. Reporting the dropping of a course to an instructor does not constitute an official withdrawal.

TRANSFER WITHIN THE UNIVERSITY

Transfer of residence to the College of General Studies, as a degree candidate, from another college, school, or division of the University may be made only with the approval of the deans concerned. Applications for transfer are available at the University's Office of Admissions or at the office of the appropriate dean. Upon transfer the student should consult his faculty adviser as to the requirements he must fulfill.

A maximum of 42 semester hours is transferrable toward the Associate in Arts in General Studies degree; a maximum of 90 semester hours is transferrable toward a Bachelor's degree; a maximum of 12 semester hours is transferrable toward a Master of Science in Administration degree; and a maximum of 6 semester hours is transferrable toward the degree of Master of Arts in Special Studies, Master of Science in Forensic Science, or Master of Science in Special Studies. Students transferring within the University are advised to note the residence requirements of the degree sought.

CREDIT

Credit toward a degree is given only after registration for and satisfactory com-

letion of the required work of courses in the University, or upon the granting f advanced standing in accordance with the regulations of the College.

For transfer from credit to audit status, see page 23.

BALANCE SHEET

On request, the Registrar will issue to undergraduate degree candidates a balance sheet showing the amount of work completed and the requirements remaining to be met for the degree. A second balance sheet will be issued only in the event the student changes major or degree objectives.

TRANSCRIPTS OF RECORD

Official transcripts of student records will be issued on request of the student or former student who has a clear financial record. A fee of two dollars is charged for each transcript.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* degree requirements are satisfied (for "Leave of Absence" exception granted by the Graduate School of Arts and Sciences, see page 65). Students who have completed course registration (including the thesis) must maintain continuous registration by paying the "continuous registration" fee (see page 25). By failing to register for one semester or more, the student breaks his registration and must be readmitted (see "Readmission," page 23). A "Readmitted Student" is required to satisfy the curriculum requirements existing at the time of his readmission. The maintaining of continuous registration normally is limited to a period of one year.

Students must be registered during the summer if they are taking courses, are taking required examinations, are receiving guidance toward theses or dissertations, or are expecting to graduate at the end of the Summer Sessions.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period of active duty, upon presentation to his dean of a copy of his orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, he must apply for readmission to the University well in advance of the semester in which he expects to return. Payments for tuition and fees which are not refunded to the student at the time he is granted military leave will be maintained as a deferred credit for his account for use upon return to the University.

GRADUATION REQUIREMENTS

To be recommended for graduation a student must have met the admission requirements of his college or school; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which he is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the

semester or summer session immediately preceding the awarding of the degree. A letter concerning degree completion is sent to military files upon request.

Application for Graduation.—An "Application for Graduation" form *must* be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the senior or final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

Scholarship.—The student must meet the scholarship requirements for the particular degree for which he is registered.

Curriculum.—See the requirements for the degree concerned.

Residence.—A student is "in residence" only when registered for course work after filing formal application for degree candidacy or for the 15 semester hours undertaken to qualify for degree candidacy, (see the specific residence requirements for the degree concerned).

With the permission of the appropriate dean, a student may be granted leave of absence; such student should, however, remain technically in residence by paying the continuous registration fee for each semester he is absent (for exception granted by the Graduate School of Arts and Sciences, see page 65). For the purpose of this regulation, the summer session is disregarded.

Except for Master's degree candidates in the Graduate School of Arts and Sciences, the School of Education, and the School of Engineering and Applied Science, service personnel who receive military transfers when they are within 6 hours of a degree may, by special arrangements, be permitted to complete their work elsewhere, transfer these credits to the College of General Studies, and receive a degree from this University. This procedure does not apply to Master's candidates who have been granted 6 hours of transferred credit or have not completed the required courses.

Attendance and Conduct.—The University reserves the right to refuse to confer a degree upon a candidate whose attendance or conduct has been unsatisfactory.

*Thesis**.—A thesis, submitted in partial satisfaction of requirements for the Master's degree, must be submitted in its final form to the appropriate dean no later than the date specified in the calendar. Two complete copies of each thesis are required. It is the responsibility of the candidate for a graduate degree to obtain from the College of General Studies a printed copy of the regulations governing the styling and reproduction of the thesis. These regulations are rigidly enforced (see page 67).

Accepted theses, with accompanying drawings, become the property of the University and are deposited in the University Library, where the duplicate copies are bound and made available for circulation.

Dissertation.—A dissertation, submitted in partial satisfaction of requirements for the Doctor of Science degree, must be submitted in its final form to the appropriate department of the School of Engineering and Applied Science no later than the date specified in the Calendar. It is the responsibility of the candidate to obtain a printed copy of the regulations governing the styling and reproduction of the dissertation (see pages 78–79).

* Applicable only to programs in the School of Government and Business Administration. See page 76 for *Thesis* in the School of Engineering and Applied Science, page 62 for *Thesis* in the School of Education.

HONORS

Dean's List.—To be eligible for inclusion on the Dean's List, a student must be a candidate for an undergraduate degree in Columbian College of Arts and Sciences or the School of Government and Business Administration. Course work taken while the application for admission is being processed will be computed in determining eligibility for the Dean's List. A full-time degree candidate in the School of Government and Business Administration programs must have a minimum quality-point index of 3.50 for the semester concerned; a part-time degree candidate must have a quality-point index of 3.50 on the last 12 semester hours of work and must have maintained continuous registration for at least one three-hour course during the period concerned. Eligibility for inclusion again will be determined on the basis of the subsequent 12 semester hours of work. In Columbian College of Arts and Sciences degree programs, a student must have received grades of *A* in at least 60 per cent of the last 15 semester hours of work and no grades below *B* for that semester.

With Distinction.—The undergraduate degrees may be conferred "With Distinction," at the discretion of the Dean's Council of the College and the Committee on Scholarship if a student meets the following qualifications: in either the School of Government and Business Administration or the School of Medicine and Health Sciences programs he must attain a quality-point index of 3.50 or higher on all work taken at this University, or in Columbian College of Arts and Sciences programs he must have received grades of *A* in at least 60 per cent of the courses taken at this University.

To be eligible for this honor a student must have completed at this University at least one-half of the course work required for the degree.

Special Honors.—Special Honors may be awarded to any member of the graduating class for outstanding achievement in the student's concentration of work on recommendation of the major department. The student must fulfill the following requirements:

1. The student must have candidacy for Special Honors approved by the faculty member representing the major department or concentration no later than the beginning of the senior year.
2. The student must meet such other conditions as may be set at the time candidacy is approved.
3. The student must have completed at this institution at least one-half of the courses required for the degree.
4. The student must fulfill the specific requirement of the college or school in which he is registered, as follows: (a) Columbian College of Arts and Sciences attainment of the grades of *A* or *B* in 50 per cent of the courses taken at this institution; or (b) the School of Government and Business Administration—maintain a quality-point index of at least 3.00 on all course work taken at this institution.

DISHONESTY

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, his registration may be cancelled. If such falsification is discovered after the student has established an academic record at the University, he may

be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Dean's Council) for subsequent registration in any unit of the University.

Academic dishonesty on the part of any student will result in a disciplinary grade of *F* for the course involved and also may, upon the recommendation of the Dean's Council, result in his suspension from the University for a stated period, at the end of which time he may petition for readmission. Upon approval of the Dean's Council, the disciplinary grade of "Failure—Academic Dishonesty" will be recorded for the course involved, and this grade will be employed in the computation of the quality-point index or academic standing. A student so suspended shall be withdrawn from all other courses except those in which all work has been completed.

THE LIBRARY

A student registered in the College of General Studies is entitled to the use of the University Library. A permit form for library privileges is issued to each student. A borrower's card may be obtained by presenting the permit form at the Circulation Desk of the Library.

The loan period for most books available for outside circulation is 30 days. A fine of 25 cents is charged for each day a book is overdue. Any book which circulates is subject to recall by the Library if needed for reserve or other use. Reserve books must be used in the reserve reading room when the Library is open, except that they may be withdrawn for overnight use beginning at 8:30 p.m. A fine of 50 cents is charged for each hour or fraction thereof that a reserve book is overdue. Grades of a student are withheld until his library record is clear.



All students using the University Library are expected to be familiar with its detailed regulations, available on application to any of the Library's Service desks.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

RECENTLY ESTABLISHED REGULATIONS

An Appendix (pages 178–80) contains regulations recently approved by the University's Board of Trustees.

UNIVERSITY POLICY ON RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the student's record confidential and out of the hands of those who would use it for other than legitimate reasons. At the same time, the policy must be flexible enough not to hinder the student, the University, or the community in their legitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; dates of attendance; verification of date and place of birth; degrees earned, if any, date, major field or area of concentration, and honors received; home and local addresses and telephone numbers; school, college, or division of enrollment, and class; verification of signature; name and address of parent or guardian.

2. The issuance of formal transcripts of record to recognized institutions of higher learning; the certification of academic achievement to the various recognized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from the student, or by court order or subpoena. If a subpoena is served, the student whose record is being subpoenaed will be notified and the subpoena will be referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to student files and records. If expressly requested, properly identified representatives from federal, state, or local government agencies may be given the information listed under No. 1 above.

Student Services

HONOR SOCIETIES

Alpha Sigma Lambda.—A National honor society for part-time evening college and off-campus undergraduate degree students, the purpose of which is to recognize and to encourage scholarship and leadership among undergraduate degree candidates. Membership is limited to students who have been enrolled for four semesters or terms in the College of General Studies and have completed 30 semester hours of work toward a degree with a 3.50 average, or equivalent. The Alpha Alpha Chapter was established at George Washington University in 1965.

Phi Beta Kappa.—Undergraduate degree candidates in the College of General Studies programs are eligible for membership in Phi Beta Kappa, national scholarship honorary society. The society recognizes "outstanding intellectual capacity well employed" in the field of liberal arts and sciences. Senior and junior students who are candidates for the degree of Bachelor of Arts, Bachelor of Science, or Bachelor of General Studies in Columbian College, and who have shown broad cultural interests, distinguished scholarly achievement, high character, general promise, and scholarly ideals may, to a number not exceeding 15 per cent of a class, be elected to membership by the faculty members of the Alpha Chapter of the District of Columbia. Seniors and juniors in other schools of the University who meet the above requirements are also eligible for consideration for membership, provided that their program of studies includes appreciable work in the liberal arts.

COUNSELING

Students in the off-campus programs may obtain educational counseling and assistance in program planning through the Office of Counseling and Information Services or from University representatives at the various off-campus centers. The Office of Counseling and Information Services coordinates student personnel services, including academic counseling, vocational guidance as related to educational programs, and liaison with other University departments and services, as well as serving as a resource center for information on tuition assistance available to students in the College of General Studies programs. Appointments may be made by calling the College of General Studies, telephone 676-7069, or through the Education Director at locations where courses are scheduled. University counselors are also available at all locations during announced registration periods and at scheduled times each month.

UNIVERSITY BOOKSTORE

Textbooks may be ordered by mail from the University Bookstore. Forms for this purpose are available at registration. The hours of the Bookstore will be announced in the *Schedule of Classes*.

The Bookstore is located in the Cloyd Heck Marvin Center, 800 21st Street, N.W.; telephone 676-6870.

VETERANS EDUCATION

The Office of the Registrar, Luther Rice Hall, 2121 Eye Street, N.W., assists students entitled to educational benefits as veterans or war orphans with any

problems which may arise concerning their benefits. This Office also processes certifications of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans should consult the Office of the Registrar prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D.C. 20421.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

The Student and Alumni Career Services Office, Woodhull House, 2033 G Street, N.W., provides assistance to degree-seeking students and alumni seeking full-time, part-time, temporary, or permanent employment.

Counseling concerning trends in employment, areas of employment, various test and examination announcements, preparation for job interviews, resume-writing, and other procedures for successful job application are always available. Specific career openings; an on-campus recruitment program by business, industry, government, and school systems; volunteer opportunities; and part-time and temporary jobs for students while attending school are all part of this service. Referral and placement functions of the on-campus College Work-Study Program are handled by the Student and Alumni Career Services Office. Teacher credential files initiated by persons seeking employment in all educational fields are maintained in this Office.

An understanding and knowledgeable approach to avenues of service for those people who do not find career satisfaction in the structured systems of business, government, and education is also provided in the Student and Alumni Career Services Office.

Continuing Education for Women

MANY WOMEN wish to resume or continue their education on a part-time basis. They feel the need to return to the classroom to update their education, prepare for new careers, qualify for job promotion, participate more effectively in community affairs, or enrich their own lives through a sense of personal growth. The Continuing Education for Women program, which originated in 1964, is designed to meet these needs. More than 3,500 women have been associated with their goals during a nine-year period.

Continuing Education for Women offers (1) *Developing New Horizons for Women*, and *Career Development for Employed Women;* (2) off-campus credit courses at hours and locations convenient for women; (3) selected noncredit courses; (4) academic counseling for women entering degree and nondegree programs; (5) a Legal Assistant Training Program, (6) a Landscape Architect Assistant Program, and (7) an Editing and Publications Program. It also cooperates with business and government agencies in designing programs to meet needs of employed women.

DEVELOPING NEW HORIZONS FOR WOMEN

Developing New Horizons for Women is offered each semester to help women develop their potential through understanding themselves as individuals and as women; to gain confidence in their abilities; to become acquainted with educational, occupational, and community service opportunities. There are no prerequisites for this course. Participants range in age from 18 to 70 and in educational background from those with no previous college education to those who have earned graduate degrees. Approximately one-half have earned Bachelor's degrees.

This 15-week noncredit course includes lectures, group discussions, guest speakers, psychological testing, and individual counseling. Participants attend class once a week for 2½ hours. This course has been held on campus as well as in Alexandria, Arlington, Falls Church, and Reston, Va.; Bethesda, Rockville, Annapolis, Columbia, Bowie, and Baltimore, Md. Four guest speaker sessions are held at the University Campus. Evening classes are also scheduled each semester.

CAREER DEVELOPMENT FOR EMPLOYED WOMEN

Career Development for Employed Women was offered for the first time in 1972 in response to requests from working women. Emphasis in this course is



Focused on exploring (1) opportunities for upward mobility in current occupation; (2) possible new careers in related fields; (3) the risks and rewards of changing to an entirely different career. Each student will be assisted in assessing her own abilities and interests, and in relating this information to educational opportunities and career outlook. Included will be testing, group and individual counseling, lectures, and some independent study. There are no prerequisites for this course.

Classes meet once a week from 7 to 9:30 pm on the University campus and at locations in Virginia and Maryland.

CAREER COUNSELING FOR GIRLS

A counseling program planned to meet the special needs of students in their last two years of high school or their first two years in college. Since girls are being offered more options, not only in occupations considered "traditional" for women but also in new and unusual fields, and since statistics show that women spend an increasing number of years in the labor force, the choice of a career merits careful consideration and an objective analysis of advantages and drawbacks.

The course offers assistance in exploring career opportunities, choosing an appropriate educational curriculum, developing effective study skills, and learning job-finding techniques. Individual counseling and group interaction encourages each girl to plan both immediate and future goals.

Sessions will be arranged for after-school hours and on Saturdays, at locations convenient to enrollees.

DAY-TIME OFF-CAMPUS CREDIT COURSES

To enable women to continue their formal education Continuing Education for Women offers credit courses off campus at hours and locations convenient for women. Classroom space has been provided by churches and community centers in Alexandria, Arlington, Annandale, Falls Church, McLean, and Springfield, Va.; Bethesda, Chevy Chase, Kensington, and Rockville, Md.; as well as the District of Columbia.

Except for Education courses, which meet for 3 hours a week, each course meets once a week for 2½ hours during the morning or early afternoon. Although many women take these courses to meet requirements for degree programs, students may also be accepted in a nondegree status. Many women who complete credit courses as nondegree students are encouraged to apply for degree candidacy at George Washington University. Other women need only specific courses to qualify for positions in business or government; some who already have degrees wish to qualify for professional certification in such fields as teaching or guidance. Many students in this program have had credits transferred to other colleges and universities throughout the country.

Increasingly, government and industry have been granting leave for employed women to enroll in daytime credit courses, particularly where the courses are job-related.

NONCREDIT COURSES

Selected noncredit courses are offered through Continuing Education for Women, taught by academically qualified instructors. Courses offered during

1973–1974 included *Introduction to Library Science; Writing and Illustrating Children's Books; Creative Thinking and Problem-solving; Oral History Workshop; A Business of Your Own; How to Study; Mathematics Refresher; Sex Discrimination and the Law; Commercial Writing; Assertiveness Training for Women; Conferences: Large or Small; CLEP Review;* and *Introduction to Landscape Architecture.*

SPECIAL PROGRAMS

LEGAL ASSISTANT TRAINING PROGRAM

During the fall of 1972, Continuing Education for Women, in cooperation with the George Washington University National Law Center, initiated the Legal Assistant Training Program. This one-year graduate-level academic Program prepares men and women to assist lawyers in research, writing, and other out-of-court functions. For admission to the Program, an applicant must have a Bachelor's degree or the equivalent in education or experience, and must successfully complete required tests. For a special brochure giving details of this Program, telephone 676-7036.

LANDSCAPE ARCHITECT ASSISTANT PROGRAM

A 12-month non-credit course in landscape and environmental design was initiated during the spring of 1974. This graduate-level Program concentrates on drafting and design, and includes a survey of plant materials as well as lectures on the varied aspects of the professional's work, providing the student with high-quality training and marketable skills in this career field. A Certificate will be awarded on the satisfactory completion of the Program. Classes are open to both men and women and are taught by professional landscape architects and horticulturists. For admission to the program an applicant must have a Bachelor's degree. For further information and a brochure, telephone 676-7036.

EDITING AND PUBLICATIONS PROGRAM

A graduate-level, noncredit training program in editorial and publishing procedures began in January 1974. The program provides men and women with the practical skills needed for careers in the publications field. It takes one year to complete. A Certificate will be awarded upon the satisfactory completion of the Program. The main areas of study are (1) editing and copywriting; (2) printing, layout, and design. Summer seminars in specialized subjects are planned. For admission to the program, an applicant must have a Bachelor's degree. For information and a brochure, telephone 676–7036.

ACADEMIC COUNSELING

The professional staff of Continuing Education for Women counsels women interested in enrolling in off-campus degree and nondegree programs. Referrals are also made to colleges, schools, and departments of the University on campus, depending upon the goals of the individual student. Counselors are available at dates and locations indicated for registration. Appointments can also

be made for individual or group counseling at the Office of Continuing Education for Women, 2130 H Street, N.W.

PROGRAM DEVELOPMENT

Nine years of experience in creating and conducting successful programs to meet needs of women has made the Staff of Continuing Education for Women uniquely qualified to design special programs for women in business or government.

The Continuing Education for Women program was originated for women. However, men are welcome to enroll in credit and noncredit courses. For further information telephone 676-7036 or write to Continuing Education for Women, George Washington University, 2130 H Street, N.W., Washington, D.C. 20006. Descriptive brochures are available.

MASTER OF ARTS IN SPECIAL STUDIES

A Master of Arts in Special Studies degree with an area of concentration in Women Studies is offered by the Graduate School of Arts and Sciences. This new interdisciplinary program prepares students for professional careers in (1) counseling and career development; (2) supervision and management; (3) teaching in Women Studies, and research related to women.

For further information, contact Dr. Ruth H. Osborn, Assistant Dean for Continuing Education for Women, and Coordinator of the Committee on Women Studies, telephone 676–7035.



DEGREE PROGRAMS

Undergraduate Degrees

THE FACULTY of Columbian College of Arts and Sciences has academic jurisdiction over the degrees of Associate in Arts in General Studies; Bachelor of General Studies with areas of concentration in History, Mathematics, Political Science, Psychology, and Sociology; Bachelor of Science in Geodetic and Cartographic Science; and Bachelor of Science in Oceanography. The Faculty of the School of Government and Business Administration has academic jurisdiction over the degree of Bachelor of Science in Administration with areas of concentration in Accounting and Business Administration. The School of Medicine and Health Sciences has academic jurisdiction over the degree of Bachelor of Science in the field of Environmental Health. These off-campus programs are administered by the College of General Studies.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 17, and "Undergraduate Degree Candidacy," pages 17–20.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on pages 31–32.

Removing an Incomplete.—In Columbian College of Arts and Sciences and the School of Government and Business Administration the grade of *I* must be removed no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the appropriate dean, or the appropriate committee, for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. In the School of Medicine and Health Sciences, unless the student completes the required work, the grade of *I* automatically becomes an *F* on the calendar year after the date of the last class meeting in the semester for which

e grade of *I* was assigned. The grade of *I* cannot be removed by reregister-g for the course here, or by taking its equivalent elsewhere.

EQUIREMENTS FOR THE ASSOCIATE IN ARTS IN GENERAL TUDIES DEGREE

ESIDENCE

he last 18 semester hours in the Associate in Arts in General Studies degree ogram must be completed in residence as a candidate for this degree. A tion of the academic work taken to qualify for degree candidacy (see page may be accepted in partial satisfaction of the residence requirement, if the urses are approved as part of the student's degree program.

EQUIREMENTS FOR THE BACHELOR'S DEGREES

ESIDENCE

he last 30 semester hours, including at least 12 hours in the area of concen-ation, must be completed in residence as a candidate for the degree sought, ess special permission is granted by the appropriate dean to take work else-ere. This requirement applies to students transferring within the University well as to students transferring from other institutions. The 15 hours taken order to be considered for degree candidacy may be counted in residence. or regulations governing military students who are transferred when they are thin 6 semester hours of their degrees, see page 36.

Transfer students to the School of Government and Business Administration o have 90 semester hours of approved transfer credits from another college university and who need only the 30-semester-hour minimum to complete gree requirements *must* plan their program of study with a faculty adviser fore registering for the first course.

In no case will credit for more than 15 semester hours of undergraduate urse work taken as a nonmatriculated student at this University be allowed ard meeting degree requirements without prior admission as a degree candi-e for the Bachelor of Science in Administration program.

Transfers.—Transfer students from other colleges or universities must com-ete satisfactorily at least 12 semester hours of the required work in their area concentration in residence as a candidate for the degree sought.

ASSOCIATE IN ARTS IN GENERAL STUDIES

culty *Adviser:* John H. McCalla, College of General Studies; Building F, Room 14, lephone 676-7016.

pon the satisfactory completion of the requirements set by Columbian Col-ge of Arts and Sciences, the degree of Associate in Arts in General Studies conferred. Students who plan to continue working toward an off-campus chelor's degree offered by Columbian College must apply to the Dean upon mpletion of the requirements for the degree of Associate in Arts in General udies. Forms for this purpose are available at the College of General Studies.

After completing the requirements for the degree of Associate in Arts in General Studies, students may wish to transfer to an on-campus degree program within the University, or they may wish to transfer to another institution. However, modifications in admission, advanced standing, and curriculum requirements permitted in the Associate in Arts in General Studies degree program may not be accepted in transfer. Therefore, while registered for this degree, students should meet the requirements of the college, school, or university to which they wish to transfer. The entrance requirements of the colleges and schools of the University are stated in this catalogue and in the *Undergraduate and Graduate Catalogue* of the University.

Scholarship.—The system of grading is described on page 31. For regulations concerning probation, suspension, and readmission, see pages 32–33.

CURRICULUM

The satisfactory completion of 60 semester hours of college work in the following curriculum is required. Students who plan to pursue a Bachelor's degree are advised to plan their Associate's program so that they will satisfy the prerequisites to the degree of their choice.

	Semester Hours
Communications	
Engl 9 or 10, 11	6
Sp&D 1, 11, 111, or 121	3
Humanities	
Nine semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72, 91–92; Mus 3, 4; Phil 50; Rel 9, 10, 59–60....	9
Natural and Mathematical Sciences	
Nine semester hours selected from the following: BiSc 3–4, 11–12; Chem 3–4, 5–6; Geol 1–2, 3, 4; Math 3, 6, 9, 10, 30, 31, 51, 52; Ocea 101–2; Phys 1, 2, 9–10; Stat 51, 101–2	9
Social Studies	
Nine semester hours are required, each course chosen from one of two departments, selected from the following: AmCv 71–72: Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40, 71–72; PSc 4 or 5, 6; Psyc 1, 8, 22, 29; Soc 1, 2	9
	24
Elective	36
Total	60

BACHELOR OF GENERAL STUDIES

Faculty Adviser: John H. McCalla, College of General Studies; Building F, Room 14. Telephone 676-7016.

The Bachelor of General Studies curriculum aims to provide the adult part-time student with the opportunity to obtain a broad education. For that reason the

ourse work required in the first and second years is distributed among Communications (written and oral), the Humanities, Natural and Mathematical Sciences, and the Social Studies. In choosing the third- and fourth-year course ork required in departments related to their concentration, students should ain counseling through the faculty adviser.

Students planning to work toward Master's degrees are advised to plan their achelor's programs so that they will meet the prerequisite requirements of the chool or college of their choice. Students planning to enter graduate programs hich require a reading knowledge of a foreign language are advised to include o years of one foreign language in their Bachelor's program.

Scholarship.—To remain in good standing and to qualify for graduation, a udent must attain grades of *A* or *B* in at least half of the minimum number semester hours of 100-level (or above) course work required in the selected as of concentration.

The system of grading is described on page 31. For regulations concerning ithdrawal, suspension, and readmission, see pages 32–33.

IRST AND SECOND YEARS

ommunications	Semester Hours
Engl 9 or 10, 11	6
Engl 20	3
Spkd 1, 11, 111, or 121	3
umanities*	
Twelve semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72, 91–92; Foreign Language (2 years of one language); Mus 3 and 4; Phil 50; Rel 9 and 10, 59–60; Slav 91–92	12
atural and Mathematical Sciences	
Six to eight semester hours selected from the following: BiSc 3–4, 11–12; Chem 3–4, 5–6; Geol 1–2, or 3 and 4; Ocea 101–2; Phys 1 and 2, or 9–10	6–8
Six semester hours selected from the following: Math 3, 6, 9, 10, 30, 31, 51, 52; Stat 51, 53, 101–2	6
ocial Studies	
Twelve semester hours selected from two of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; PSc 4 and 6; PSc 5 and 6; Psyc 1 and 8; Psyc 1 and 22; Psyc 1 and 36; Soc 1 and 2	12
lective (depending on science option)	10–12
	60

*Students who plan to continue study for advanced degrees are urged to fulfill the 2-year language

THIRD AND FOURTH YEARS

Concentrations are offered in History, Mathematics, Political Science, Psychology, and Sociology.

Concentration Requirements (to be selected in consultation with the faculty adviser):	Semester Hours
100-level courses in the department of the selected area of concentration	24*
100-level courses in two or more related departments	18*
Elective	18
Total	120

BACHELOR OF SCIENCE

Faculty Advisers: First two years—John H. McCalla, College of General Studies, Building F, Room 14, Telephone 676-7016. Third and fourth years—Jack W. Millar, Vivian Gill Professor of Epidemiology and Environmental Health, Ross Hall, Telephone 331-6117.

The Bachelor of Science curriculum in Environmental Health is designed to provide students with the requisite training to function effectively as Environmental Health Officers in domestic and foreign areas. Candidates are prepared for participation in community or regional program planning, community education, staff personnel training, and supervision in official or voluntary health organizations.

Entrance requirements are stated on pages 17–20; residence requirements on page 47.

The determination of acceptability of a student to the program leading to the degree of Bachelor of Science in the field of Environmental Health will be made by the faculty advisers appointed by the Department of Epidemiology and Environmental Health. The decision to accept a student must be unanimous. The degree is granted by the School of Medicine and Health Sciences.

Scholarship.—To remain in good standing and to qualify for graduation, a student must maintain an overall quality-point index of 2.00 in course work and a quality-point index of 2.50 in course work taken in the major area of concentration.

The system of grading is described on page 31. For regulations concerning probation, suspension, and readmission, see pages 32–33.

FIRST AND SECOND YEARS

	Semester Hours
Communications	6
Engl 9 or 10, 11	6
Engl 20; Sp&D 111 or 121	

* Students selecting Psychology or Sociology as an area of concentration are required to take 18 semester hours of 100-level Psychology courses (for the Psychology area of concentration) or Sociology course (for the Sociology area of concentration) and 24 semester hours of 100-level courses in two or more related departments.

	Semester Hours
Humanities	
Twelve semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72, 91–92; Foreign Language (2 years of one language); Phil 50	12
Natural and Mathematical Sciences	
Biol 11–12, Chem 11–12	16
Six semester hours selected from the following: Math 3, 6, 9, 10, 30, 31, 51, 52; Stat 51, 101–2	6
Social Studies	
Six semester hours selected from one of the following combinations: Anth 1–2; Econ 1–2; Psyc 1 and 8; Psyc 1 and 22; or Soc 1 and 2	6
Elective	8
	60

THIRD AND FOURTH YEARS

Concentration Requirements (to be selected, in consultation with the adviser, from the following Epidemiology and Environmental Health courses)....	30

Environmental Sanitation—Epid 101, 102, 103, 104
Public Health Epidemiology—Epid 121, 122, 123, 131
Public Health Entomology—Epid 141, 142, 143, 144
Public Health Microbiology—Epid 151, 152, 153, 154
Occupational Health—Epid 171, 172
Public Health Administration—Epid 191, 192

Practicum Requirement (This requirement may be waived with the approval of the Department; however, students will be required to substitute 12 semester hours of approved courses.) Epid 180	12
Elective	
100-level courses in two or more related departments in consultation with the faculty adviser, selected from Anthropology, Biological Sciences, Chemistry, Geology, Psychology, and Sociology	18
Total	120

BACHELOR OF SCIENCE IN ADMINISTRATION

Academic Advising: Information and Advising Center, Government 105, Telephone 676-7027

The Bachelor of Science in Administration curriculum aims to provide the full or part-time student with the opportunity to obtain a broad education in preparation for careers in accounting or business administration. Students should obtain both general educational counseling and specific area of concentration advising when initially considering their curriculum. A conference con-

[1] Electives selected with the approval of the adviser.

cerning curriculum planning for courses to be taken as a degree candidate is *required* of each applicant *before* admission to degree candidacy. The course work required in the first and second years is a general curriculum for both the Accounting and Business Administration concentration. The course work required for the third and fourth years is chosen from either the Accounting or Business Administration area of concentration curriculum. In choosing the third- and fourth-year course work required in departments related to their concentration, students should obtain counseling through the appropriate departmental faculty adviser. Except for Acct 115, 121, and 191, no student may receive credit for courses in Accounting and Business Administration numbered *above the 100-level* unless third-year (junior) standing has been attained. Also, an exception is made for those 100-level courses (B Ad 102, 105, and Mgt 118) specifically approved by the School of Government and Business Administration which are taken in the program of study leading to the degree of Associate in Arts in General Studies. Students who elect B Ad 102, 105, and Mgt 118 while enrolled in the Associate in Arts in General Studies degree program will receive *elective* credit for these courses if they transfer to the Bachelor of Science in Administration degree program as juniors. However, an additional course in each of the three areas covered by these courses must be taken to fulfill the core requirements of the degree of Bachelor of Science in Administration. The course work for all four years is described on the following pages.

Students are reminded that Accounting and Business Administration courses taken at accredited 2-year colleges may be applied toward the degree of Bachelor of Science in Administration provided they are comparable to below 100-level courses required in the first and second years of the curriculum.

Students planning to work toward Master's degrees are advised to plan their Bachelor's programs so that they will meet the entrance requirements of the school or college of their choice.

SCHOLARSHIP

The system of grading and computing scholarship is described in detail on page 31. For regulations concerning probation, suspension, readmission, see pages 32–33.

To remain in good standing and to qualify for graduation, a student must maintain a general quality-point index of 2.00 and a quality-point index of at least 2.50 in his area of concentration.

ACCOUNTING AND BUSINESS ADMINISTRATION CURRICULUM

FIRST YEAR	Semester Hours
Accounting	6
Acct 1–2	
English Composition	6
Engl 9 or 10, 11	
Science	
Six to eight semester hours selected in consultation with the adviser from the following: BiSc 3–4; Chem 5–6; Geog 51 and 52; Geol 1–2, or 3 and 4; Phys 1 and 2, or 3 and 4, or 9–10	6–8

	Semester Hours
Social Studies	
Econ 1–2	6
Elective (to be selected in consultation with the adviser from courses other than those in Accounting, Business Administration, and Economics)	4–9
	30

SECOND YEAR

Business Administration	
B Ad 51	3
Art, Literature, Language, Music, and Philosophy*	
Six semester hours selected in consultation with the adviser from the following: Art 31; Engl 43–44, 45–46, 51–52, 71–72, 91–92; Foreign Language (1 full year of a foreign language); Mus 3; Phil 50	6
Mathematics	
†Math 31 and 32, or 51 and 52	6
Social Studies	
Psyc 1, 8	6
Six semester hours selected in consultation with the adviser from the following: Anth 1; Hist 71–72; PSc 4 or 5, 6; Soc 1	6
Statistics	
Stat 51 or 101	3
	30

ACCOUNTING CONCENTRATION CURRICULUM

THIRD YEAR

Acct 101:	Cost and Budgetary Control	3
Acct 121:	Intermediate Accounting	3
Acct 161:	Federal Income Taxation	3
Acct 191:	Advanced Accounting	3
BAd 102:	Fundamentals of Management	3
BAd 131:	Business Finance	3
BAd 141:	Basic Marketing Management	3
BAd 161:	Commercial Law	3
Mgt 118:	Introduction to Information Processing	3
Elective:	(Three semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	3
		30

*Students selecting Accounting as an area of concentration may postpone this 6-hour requirement until the third year if they wish to elect Acct 121 and 191 in the second year.

†Math 31 and 32 are recommended for those students who plan to take graduate work in quantitative methods.

FOURTH YEAR

		Semester Hours
Acct 132:	Accounting Theory	3
Acct 171:	Auditing	3
Acct 181:	Accounting Systems	3
BAd 101:	The Business Environment	3
BAd 181:	Manufacturing Production	3
BAd 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Stat:	Three semester hours selected in consultation with the adviser from the following	3
Stat 111:	Business and Economic Statistics I	
Stat 155:	Introduction to Probability	
Stat 187:	Theory of Sampling	
Elective:	(Three semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	3
Elective:	(Three semester hours selected in consultation with the adviser from 100-level courses)	3
	Total semester hours	120

BUSINESS ADMINISTRATION CONCENTRATION CURRICULUM

THIRD YEAR

Acct 193:	Business Budgeting	3
BAd 102:	Fundamentals of Management	3
BAd 105:	Personnel Management	3
BAd 131:	Business Finance	3
BAd 141:	Basic Marketing Management	3
Mgt 118:	Introduction to Information Processing	3
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	6
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses)	6
		30

FOURTH YEAR

BAd 101:	The Business Environment	3
BAd 161:	Commercial Law	3
BAd 181:	Manufacturing Production	3
BAd 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Psyc 144:	Personnel and Industrial Psychology	3
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses in Accounting, Business Administration, or Economics)	6
Elective:	(Six semester hours selected in consultation with the adviser from 100-level courses)	6
		120

Total semester hours

BACHELOR OF SCIENCE IN GEODETIC AND CARTOGRAPHIC SCIENCE

Faculty Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science; Telephone 946-3557. Counseling by appointment only, Telephone 676-7013.

The course work in this four-year curriculum is offered on and off campus. The Cartography, Geodesy, Geophysics, and Oceanography courses are given at the National Oceanic and Atmospheric Administration, the Naval Oceanographic Office, the U.S. Army Topographic Command, and at other locations not too distant from the campus.

Entrance requirements are stated on pages 17–20; residence requirements are stated on page 47.

SCHOLARSHIP

The system of grading is described on page 31. For regulations regarding probation, suspension, and readmission, see pages 32–33.

To remain in good standing and to qualify for graduation, a student must maintain grades of *B* or better in half of the courses taken in one of the two areas of concentration: (1) *Cartography*—Cart 103, 104, 111, 112, Geod 110, Geop 105; (2) *Geodesy*—Geod 110, 155, 156, 160, 161, Geop 105.

CURRICULUM

	Required—First Year	Semester Hours
Cart 1–2:	Introduction to Cartography	6
Engl 10:	English Composition: Language as Communication	3
Engl 11:	English Composition: Language and the Arts and Sciences	3
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Phys 1:	General Physics	4
Phys 2:	Introduction to Modern Physics	4
Social Studies:	To be selected from the following	6
AmCv 71–72:	Introduction to American Civilization	
Anth 1–2:	Introductory Anthropology	
Econ 1–2:	Principles of Economics	
Geog 51:	Introduction to Geography	
Geog 52:	Introduction to Economic Geography	
Hist 39–40:	European Civilization in Its World Context	
PSc 4 or 5, 6:	Introduction to Political Science	
Soc 1:	Introductory Sociology	
Soc 2:	Uses of Sociology	
		32

	Required—Second Year	
Cart 107:	Physiography	3
Chem 11–12:	General Chemistry	8
Engl 51–52:	Introduction to English Literature, or	
Engl 71–72:	Introduction to American Literature	6
Geod 12:	Plane Surveying	3
Geod 13:	Geodetic Surveying	3

		Semester Hours
Geol 1 or 3:	Introductory Geology for Nonscience Majors	3
Math 32:	Calculus of Several Variables	3
Math 33:	Calculus of Vector Functions	3
		32

Required—Third Year

Geod 17:	Elementary Photogrammetry	3
Geod 18:	Intermediate Photogrammetry	3
Geod 110:	Map Projections	3
Geop 105:	Elementary Geophysics	6
Ocea 101–2:	Elementary Oceanography	6
Other Courses:	Six semester hours to be selected from the following	
Art 31–32:	Survey of Western Art	
Art 71–72:	Introduction to the Arts in America	
Mus 3:	Introduction to Musical Understanding	
Mus 4:	Survey of Music Literature	
Phil 50:	Introduction to Philosophy	
Rel 9:	The Old Testament	
Rel 10:	The New Testament	
Rel 21:	Introduction to Religious Thought	
Rel 59–60:	History of Religions	6
Elective:	(Selected in consultation with the adviser)	30

Areas of Concentration

Two areas of concentration are open to students in this program; students select one at the beginning of the fourth year.

Required—Fourth Year

CARTOGRAPHY CONCENTRATION		6
Cart 103–4:	Photo Interpretation	3
Cart 111:	Cartographic Techniques	3
Cart 112:	Advanced Cartography	3
*Elective:	(Courses in Cartography, Geodesy, Geophysics, and Oceanography selected in consultation with the adviser)	14
		120
	Total	

GEODESY CONCENTRATION		3
Geod 155:	Elementary Geodesy	3
Geod 156:	Geodetic Astronomy	3
Geod 160:	Mathematics of Adjustments and Least Squares	3
Geod 161:	Adjustments in Geodesy and Photogrammetry	3
*Elective:	(Courses in Cartography, Geodesy, Geophysics, and Oceanography selected in consultation with the adviser)	14
		120
	Total	

* Recommended courses: Cart 120, 125, 130; Ocea 120.

BACHELOR OF SCIENCE IN OCEANOGRAPHY

Faculty Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science: Telephone 946-3557. Counseling by appointment only, Telephone 676-7013.

The course work in this four-year curriculum is offered on and off campus. The Cartography, Geodesy, Geophysics, and Oceanography courses are given at the National Oceanic and Atmospheric Administration, the Naval Oceanography Office, the U.S. Army Topographic Command, and at other locations too distant from the campus.

Entrance requirements are stated on pages 17–20; residence requirements are stated on page 47.

SCHOLARSHIP

The system of grading is described on page 31. For regulations concerning probation, suspension, and readmission, see pages 32–33.

To remain in good standing and to qualify for graduation, a student must obtain grades of *B* or better in at least 9 semester hours of course work in the following: Geop 105; Ocea 101–2; and 9 semester hours selected from Ocea 111, 112, 113, 114, 115.

CURRICULUM

	Required—First Year	Semester Hours
Cart 1–2:	Introduction to Cartography	6
Engl 10:	English Composition: Language as Communication	3
Engl 11:	English Composition: Language and the Arts and Sciences	3
Math 30:	Precalculus	3
Math 31:	Calculus of One Variable	3
Phys 1:	General Physics	4
Phys 2:	Introduction to Modern Physics	4
Social Studies:	To be selected from the following	6
AmCv 71–72:	Introduction to American Civilization	
Anth 1–2:	Introductory Anthropology	
Econ 1–2:	Principles of Economics	
Geog 51:	Introduction to Geography	
Geog 52:	Introduction to Economic Geography	
Hist 39–40:	European Civilization in Its World Context	
PSc 4 or 5, 6:	Introduction to Political Science	
Soc 1:	Introductory Sociology	
Soc 2:	Uses of Sociology	
		32

	Required—Second Year	
BiSc 11–12:	Introduction to Biology for Science Majors	8
Engl 51–52:	Introduction to English Literature, or	
Engl 71–72:	Introduction to American Literature	6
Geol 1 or 3:	Introductory Geology for Nonscience Majors	3
Geol 2 or 4:	Introductory Geology for Nonscience Majors	3
Math 32:	Calculus of Several Variables	3

		Semester Hours
Math 33:	Calculus of Vector Functions	3
Ocea 101–2:	Elementary Oceanography	6
		32

Required—Third and Fourth Years

Cart 107:	Physiography	3
Cart 108:	Climatology	3
Chem 11–12:	General Chemistry	8
Geop 105:	Elementary Geophysics	3
Oceanography:	To be selected from the following	15
Ocea 11:	Navigation	
Ocea 110:	Physical Oceanography	
Ocea 111:	Ocean Waves and Tides	
Ocea 112:	Biological Oceanography	
Ocea 113:	Marine Geophysics	
Ocea 114:	Chemical Oceanography	
Ocea 115:	Geological Oceanography	
*Other Courses:	(Courses in Biological Sciences, Chemistry, Geology, Geophysics, Oceanography, and Physics, selected in consultation with the adviser)	18
Elective:	To be selected from the following	6
Art 31–32:	Survey of Western Art	
Art 71–72:	Introduction to the Arts in America	
Mus 3:	Introduction to Musical Understanding	
Mus 4:	Survey of Music Literature	
Phil 50:	Introduction to Philosophy	
Rel 9:	The Old Testament	
Rel 10:	The New Testament	
Rel 21:	Introduction to Religious Thought	
Rel 59–60:	History of Religions	
	Total	120

SPECIAL DEGREE PROGRAMS

SERVICEMEN'S OPPORTUNITY COLLEGE (SOC)

George Washington University has been designated a Servicemen's Opportunity College (SOC). SOC provides opportunities for servicemen to pursue educational program goals through courses offered on base, in the evenings, on weekends, and at other nontraditional time frames. In support of the concept, George Washington University, while still maintaining its normal academic standards, assumes the responsibilities of meeting the educational needs of an individual serving in the Armed Forces. Provisions have been established whereby these individual needs can be met. Specifically, individuals designated as SOC students who desire to obtain an Associate's or a Bachelor's degree from George Washington University's Columbian College of Arts and Sciences will be assured of a degree completion program through use of the agreement that follows:

* Recommended courses: Cart 120, 125, 130; Ocea 120.

REEMENT

orge Washington University, a Servicemen's Opportunity College, agrees to e following:

I. Upon admission to Associate in Arts in General Studies or Bachelor of eneral Studies degree candidacy, the student may take the required course rk either on or off campus. Regardless of where taken, courses of study en while a degree candidate may be applied toward the degree sought, as a irement or an approved elective. Although the grade of *D* is not accept- for transfer, it may be used to satisfy a curriculum requirement. It may however, be counted toward the total number of semester hours required the degree, and it should not be repeated. Courses will be taken from orge Washington University unless the serviceman is transferred to a lo- on not served by this University. In the case of transfer and in consid- on of the student's future assignment, arrangements will be made between student and the counselor assigned to him by the College of General Stud- to ensure that the courses he takes elsewhere satisfy his George Washington ersity program.

II. Academic credit may be obtained by any one or a combination of the wing:

A. Registration as an on- or off-campus, full- or part-time student at this ersity.

B. Advanced standing for academic studies taken at other accredited insti- ons where such studies meet the requirements for the degree, or by examina- (A maximum of 42 semester hours allowed for the Associate's degree; a mum of 90 semester hours allowed for the Bachelor's degree.)

Within the maximum of 42 hours of credit allowed for advanced standing ard the Associate in Arts in General Studies degree, a maximum of 30 hours be obtained by any one or combination of the methods below. Within the mum of 90 hours of credit allowed for advanced standing toward the elor of General Studies degree, a maximum of 60 hours may be obtained any one or combination of the methods below.

College-Level Examination Program (CLEP) Subject Examinations.—P Subject Examinations are offered in 29 subject areas. These tests meas- achievement in the equivalent of specific college-level courses. (Credit not be earned by passing the examination after having taken the equivalent se.) Maximum credit allowed for Associate's degree, 30 semester hours; mum allowed for Bachelor's degree, 60 semester hours.

College-Level Examination (CLEP) General Examination.—CLEP Gen- Examinations are offered in five areas: Mathematics; Social Sciences; Hu- ies; Natural Sciences; and English Composition. (Credit—advanced ng—is not given for the General Test in English Composition.) To be e to take the CLEP General Examinations, a student must have been out ondary school for three years or more, and he must not have been enrolled regular college program during that time. Maximum credit allowed, 24 ter hours.

Columbian College of Arts and Sciences Special Department Examina-—A student may request any department of Columbian College to offer special examination covering the subject matter of any specific course. appropriate CLEP Subject Examination is available, the department may se to employ it.) If a student performs satisfactorily, he may receive

credit (advanced standing), waiver of requirement, or both, at the discretion of the department. (A student who has previously taken examinations to waive course requirements may not, however, at a later time take examinations for credit in the same courses.) Special departmental examinations will normally be of at least three hours' duration. A fee of $25 for each course examination is charged for preparing, administering, and grading. Maximum credit allowed for Associate's degree, 30 semester hours; maximum allowed for Bachelor's degree, 60 semester hours.

4. *Service Schools.*—A maximum of 30 (or a maximum of 12 hours if the courses are "professional") semester hours may be obtained on the basis of service schools satisfactorily completed, as evaluated in accordance with the "Guide to the Evaluation of Educational Experience in the Armed Forces," issued by the Committee on Accreditation of Service Experience. Ordinarily such subjects are counted as electives. No credit will be allowed for military experience as such.

5. *Correspondence Courses.*—A maximum of 15 semester hours may be earned through the successful completion of correspondence courses of college level which are offered by the U.S. Armed Forces Institute or a regionally accredited college or university.

III. The minimum requirement for the Associate in Arts in General Studies degree is 60 semester hours; the minimum requirement for the Bachelor of General Studies degree is 120 semester hours. A minimum of 18 semester hours for the Associate's degree and a minimum of 30 hours for the Bachelor's degree must be completed at George Washington University, but may be completed at any point in the student's program of study. At least 6 semester hours in the selected area of concentration must be taken at this University.

IV. The College of General Studies will handle and coordinate administrative matters and be the point of contact with the college granting the degree. The provisions as stated in the *College of General Studies* catalogue will apply in all cases not specifically mentioned in this agreement.

V. Tuition and fees will be as stipulated in the *College of General Studies* catalogue on a year-to-year basis.

VI. Students accepted under this program are subject to the probation and suspension regulations of the University, and are required to maintain scholastic standards.

VII. In addition to trained counselors, University Representatives are assigned to each installation to assist in the counseling function.

ACCELERATED ASSOCIATE'S DEGREE COMPLETION PROGRAM

The Accelerated Associate's Degree Completion Program is available at Henderson Hall and Fort Myer in Virginia, and at the Washington Navy Yard in the District of Columbia.

This accelerated Program permits an individual to complete the degree of Associate in Arts in General Studies in approximately 18 months through part-time study. Time to complete the Program will vary according to the amount of advanced standing granted through transfer of credit or by examination and according to the number of courses the student is enrolled in. The Program is designed for the highly motivated individual who must complete his program of study in a limited period of time. Classes are open to everyone.

Graduate Degrees

MASTER OF ARTS

E DEGREE OF MASTER OF ARTS with a field in Religion and Medical Care
new degree program offered by the Graduate School of Arts and Sci-
under the direction of the Department of Religion. Although certain
ses in this program are offered only through the College of General Studies'
ampus centers, candidates for this degree must register as a campus degree
idate in the Graduate School of Arts and Sciences.

The program of study is interdisciplinary and combines both professional
academic work. The intent of the program is (1) to provide training in
academic graduate milieu of chaplains and clergymen whose professional
iveness might be increased through the combination of clinical experience
academic study; (2) to provide a program of study for those medical stu-
ts who have a sense of the significance of theological insights for the care
the whole man and who desire to combine their medical education with
correlative study; and (3) to provide a program of research and study in
rea of religion and medical care for those whose theological training (e.g.,
thics or sociology of religion) and interest are directed toward a vocation
eaching. Support for the program comes from (1) Clinical Training pro-
ms of the National Naval Medical Center, National Institutes of Health,
Walter Reed General Hospital; and (2) the departments of Health Care
dministration, Psychology, Religion, Sociology, and departments of the
ool of Medicine and Health Sciences.

The program of study leading to the degree of Master of Arts in the field
Religion and Medical Care consists of 36 semester hours of approved course
rk with or without a thesis and the passing of a Master's Comprehensive
amination.

For information concerning admission requirements and the specific require-
nts for the degree, contact the Graduate School of Arts and Sciences or the
airman of the Department of Religion.

MASTER OF ARTS IN EDUCATION

The School of Education has academic jurisdiction over the degree of Master
f Arts in Education. This off-campus degree program is designed for educa-
rs who wish to increase their knowledge of professional and academic infor-
ation and to prepare for special types of educational service.

The Master of Arts in Education degree programs offered at off-campus
nters are available in the following fields: elementary administration; ele-
entary education; higher education; human resource development; secondary
dministration; secondary education; special education—crisis-resource teach-
g, diagnostic-prescriptive teaching, early childhood special education; and
upervision and human relations.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 17, and
page 20.

REQUIREMENTS FOR THE DEGREE

The program of study consists of a minimum of 33 or 36 semester hours of course work, depending upon the chosen field. The thesis (equivalent to 6 semester hours) is optional.

RESIDENCE

Advanced standing is granted for approved courses taken at other accredited institutions; however, a minimum of 30 semester hours must be completed at this University, with no less than 21 semester hours completed after admission to Master's degree candidacy.

SCHOLARSHIP

A quality-point index of 3.00 is required for graduation. Students who receive a grade of *C* in more than two courses are subject to suspension. Students who receive a grade of *F* must confer with the Dean of the School of Education before enrollment for further work.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W* (Authorized Withdrawal) may be assigned are described on pages 31–32.

Removing an Incomplete.—Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much briefer period within which the uncompleted work (usually the final examination or a required paper) must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An "Incomplete" cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council. An "Incomplete" which is not removed within one calendar year is automatically changed to an *F*.

THE THESIS

Students who elect a thesis must register on campus for Educ 299–300. The choice of the thesis subject must be approved in writing by the student's adviser and filed in the Office of the Dean. A statement of the School of Education standards for the thesis and printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the Dean.

Payment of tuition for the thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, an additional calendar year may be granted without further tuition payment. The student must, however, maintain continuous registration (see page 35) during this period. If the preparation of the thesis extends beyond the additional calendar year, the student must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to the course examinations, the candidate must pass a special three-hour examination on his area of specialization. Candidates for the examination must be registered for the semester it is to be taken, and must file a written application in the Office of the School of Education no later than thirty days prior to the date of the examination.

MASTER OF ARTS IN SPECIAL STUDIES AND MASTER OF SCIENCE IN SPECIAL STUDIES

The Graduate School of Arts and Sciences has academic jurisdiction over the degrees of Master of Arts in Special Studies and Master of Science in Special Studies. These degree programs provide a course of study appropriate to those students who wish to emphasize interdisciplinary work. They are offered both off and on campus. The programs off campus can only be offered for a group of students with mutual educational goals. The programs allow a maximum of flexibility; however, they must be developed around identified objectives and must provide a structured sequence of study toward these goals. University representatives will work with interested groups to develop suitable programs. The contemplated curriculum must be approved prior to admission to the Graduate School. A student interested in interdisciplinary work leading to one of these degrees who is not in a group program must register on campus.

For information on Special Studies programs currently available in off-campus programs, see "Special Degree Programs," pages 79–81.

For detailed information on the regulations for the off-campus degrees, see the *Handbook for Off-campus Students*, available at the Office of the Dean of the Graduate School of Arts and Sciences.

ADMISSION

For detailed information, see "Admission as a Degree Candidate," page 17, and page 21.

REQUIREMENTS FOR THE DEGREES

The program of study consists of 36 semester hours of course work including a plurality of courses in the arts and sciences (e.g., economics, natural sciences, political science, psychology, sociology, statistics), with not more than one-third from any single department. *There are no thesis or tool requirements.* Advanced undergraduate courses (those numbered 101–200) may be included in the program of study upon the approval of the Graduate School and with the provision that students complete additional work for graduate credit.

Each program of study must be approved by the Dean of the Graduate School of Arts and Sciences and the departmental advisers.

RESIDENCE

A minimum of 27 semester hours must be completed after admission to Master's degree candidacy.

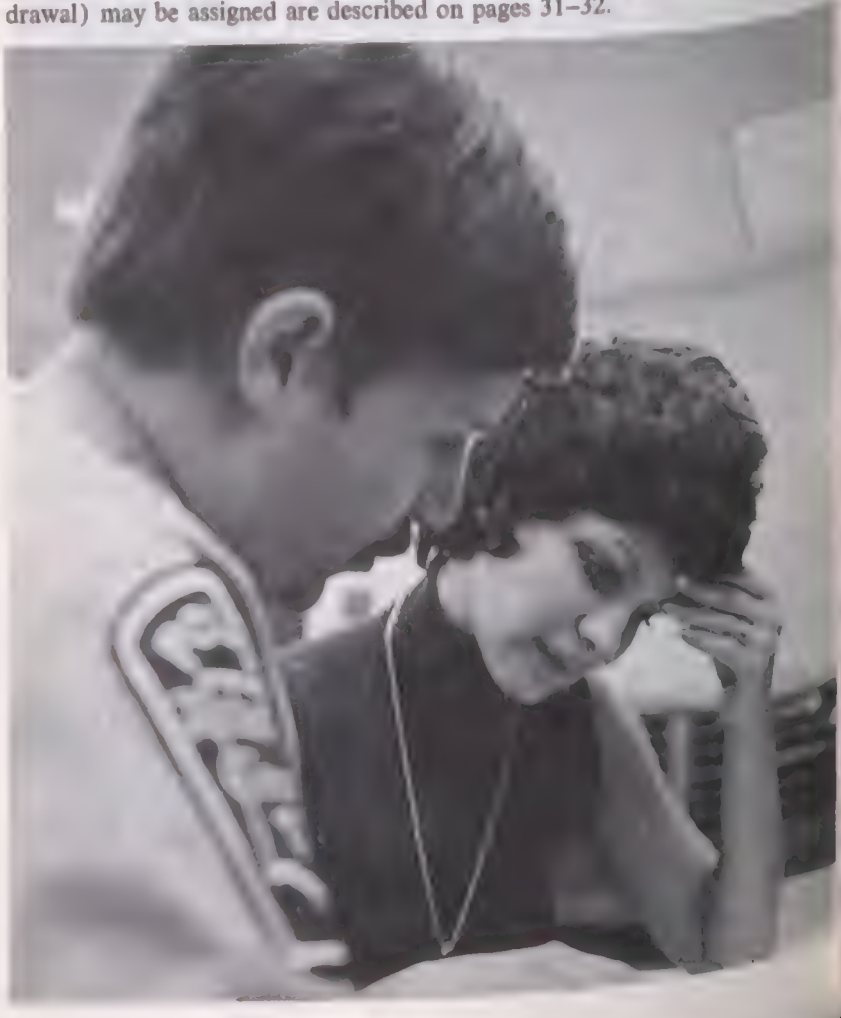
SCHOLARSHIP

Graduate students are expected to maintain a minimum accumulative grade average of *B* (3.00) in all course work in the program of studies. Individual departments may require a higher average.

In the case of a student who receives a grade of *F* for a course in his program of studies, the Graduate School will require a departmentally approved written statement justifying the student's continuance in the Graduate School and outlining the program to be followed. Continuation is contingent upon the Dean's approval. A course in the program of studies for which an *F* is received cannot be subsequently removed from the program even though another course is taken as a substitute.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on pages 31–32.



Removing an Incomplete.—An "Incomplete" must be made up before the lapse of one calendar year. An "Incomplete" which is not removed within one calendar year remains as a grade of *I* on the student's record. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

MASTER'S COMPREHENSIVE EXAMINATION

Master's degree candidates must pass a Master's Comprehensive Examination administered by the Graduate School of Arts and Sciences on campus on specified dates.

A student who fails to pass the Master's Comprehensive Examination may, in exceptional circumstances, and with the approval of the department and the Dean, repeat the Examination at the next scheduled date. If he fails a second time, no further opportunity to take the Examination is permitted.

WITHDRAWAL

Graduate students who intend to withdraw from the Graduate School of Arts and Sciences should inform the School in writing. The last day for complete withdrawal without academic penalty is at the end of the eighth week of classes.

LEAVE OF ABSENCE

If a student is temporarily unable to continue his program of studies, he may request leave of absence for a specific period of time, not to exceed one calendar year. When the period of leave has expired, it is the student's responsibility to notify the Graduate School at least two months in advance of a given registration period of his intention to reregister. If he fails to reregister, his candidacy will be terminated.

MASTER OF SCIENCE IN ADMINISTRATION

The School of Government and Business Administration has academic jurisdiction over the degree of Master of Science in Administration. This degree program provides a course of study appropriate for those students currently working in government or industry. It is a professional degree, preparing graduates for positions of higher and broader responsibility and generally improving their competence as administrators. Students expecting to continue in a doctoral program should consult the Committee on Doctoral Studies in the School of Government and Business Administration concerning necessary prerequisites. Students will usually find it advantageous to consult with the Committee early in planning their Master's degree programs.

The University cannot guarantee that all courses in this curriculum will be offered at every off-campus center. However, any student who has been admitted to degree candidacy may arrange to complete his curriculum by registering on campus. *Campus registration is limited to 12 semester hours of the last 18 hours of the degree program.* Only students with Bachelor's degrees may register for courses numbered above the 200 level in the School of Government and Business Administration.

OBJECTIVES OF THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

The principal objective of the School of Government and Business Administration is to prepare its graduates for positions in the management of complex organizations in both business and government. The degree programs are designed to prepare students both for *entrance* into business and government and for *advancement* to high-level management positions.

Programs in the School include examination of administrative principles and quantitative approaches to decision-making common to both business and government. These programs stress the points at which major policy decisions of either business or government must give consideration to related policy decisions of the other. Emphasis is placed on the fact that management education is not limited to organizational techniques but is, in the broadest sense, education for management responsibility.

It is the policy of the School to emphasize a broad fundamental education as the best preparation for positions carrying management or administrative responsibility.

The degree of Master of Science in Administration develops the elements common to all management positions regardless of the nature of the operation. This degree program is based on the study of the principles of management, human relations, and problem-solving plus an area of specialization.

In order to provide students with a common body of knowledge of business or governmental administration, programs include the equivalent of at least one year of work comprising the following areas:

1. In the case of business enterprise, a background of the concepts, processes, and institutions in marketing and distribution, production, and financing functions; in the case of governmental administration, a background of concepts, processes, and institutions of planning, programming, budgeting, personnel practices, and policy formulation in government.

2. A background of the economic and legal environment of business and government enterprise, along with consideration of the social and political influences on business.

3. A basic understanding of the concepts and methods of accounting or budgeting, quantitative methods, and information systems.

4. A study of organization theory, interpersonal relationships, control and motivation systems, and communications.

5. A study of administrative processes under conditions of uncertainty, including the integration of analysis and policy determination at the over-all management level.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 17, and pages 20–21.

REQUIREMENTS FOR THE DEGREE

RESIDENCE

A minimum of 30 semester hours of graduate work must be completed while registered as a degree candidate in this off-campus program.

The thesis and thesis seminar (6 semester hours) may be included in the 30 hours of course work taken in residence. A graduate student who transfers from another division of the University is required to have a minimum of 12 hours of course work as a degree candidate in this off-campus program.

SCHOLARSHIP

An average of *B* or better is required for the Master's degree. The grade of *C* is not considered as failing but must be counter-balanced by a grade of *A* in a graduate course of equal status. A Master's degree candidate who receives a grade of *F* in a course required in his program of study is required to present cause for consideration by the Dean's Council of the School of Government and Business Administration as to why he should be allowed to continue his studies toward a degree objective. A student whose scholarship is unsatisfactory may be suspended.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on pages 31–32.

Removing an Incomplete.—The grade of *I* must be removed no later than the last day of the examination period for the fall or spring semester immediately following the semester or summer session in which the grade of *I* is assigned. An "Incomplete" that is not removed within this period is automatically changed to an *F*. In cases of well-documented extenuating circumstances, an instructor and a student may jointly petition the Dean, or the appropriate committee, for additional time in which to complete the work of the course. Such petitions should be submitted within the same period. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere.

THESIS

With the approval of the adviser, a thesis may be substituted for 6 semester hours of course work.

The thesis subject and the thesis in its final form must be approved by the director of the thesis and the faculty adviser and presented to the Dean of the School of Government and Business Administration no later than the date announced in the calendar. Printed copies of detailed regulations regarding the form and reproduction of the thesis are available at the Office of Counseling and Information Services, College of General Studies.

Payment of tuition for the thesis entitles the candidate, during the two semesters he registers for thesis (299–300), to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, an additional successive academic year is granted without further tuition payment. The student must, however, maintain continuous registration during this period. If the preparation of the thesis extends more than three semesters beyond the date the student registers for thesis 300, he must register for the entire 6 hours of thesis again and pay tuition as for a repeated course.

COURSE SUBSTITUTION

It is the responsibility of the student to get written approval from the faculty adviser prior to registration for any course substitution. Forms for requesting substitution are available at the Office of Counseling and Information Services, College of General Studies.

MASTER'S COMPREHENSIVE EXAMINATION

The Master's candidate is required to pass a written Master's Comprehensive Examination. Before applying for the Examination, the student must have completed or be registered for all of the courses in his program, and he must have maintained a 3.00 (*B*) average. If a student has completed all course work, continuous registration must be maintained, and the continuous registration fee paid, until the Examination is taken, except for the Summer Sessions if the student does not intend to take the Examination at that time. *After applying for the Examination, a candidate may withdraw only by notice in writing to the appropriate department chairman. Failure to take the Examination without an official withdrawal constitutes a failure for the Examination.* In writing the Examination, the student is expected to correlate what he has learned in his course work and his reading in the literature of the field. The Examinations are conducted at the University in December for students graduating in February, in April for students graduating in May, and in July and August for students graduating in September.

A candidate who fails the Examination may, in exceptional circumstances and with specific approval of his advisers, repeat the Examination, but only after the lapse of one semester and the undertaking of additional preparation as prescribed. *If he fails a second time, no further opportunity to take the Examination will be permitted.*

REQUIRED COURSES

The following courses are listed in the approximate order they should be elected in the student's program of study:

		Semester Hours
Mgt 201:	Advanced Administrative Management	3
*Mgt 204:	Quantitative Factors in Administration	3
Mgt 207:	Human Behavior in Organizations	3
Mgt 240:	Survey of Information Technology	3
BAd 202:	Relations of Government to Business	3
‡†Econ 220:	Survey of Principles and Issues in Economics	3
		12–18
Area of Concentration:		12–24
‡Elective:	To be selected with the approval of the adviser	0–6
	Total	36

* Mgt 204 is waived for students electing Administration of Science and Technology, Business Financial Management, Information Systems Technology, or Operations Research and Systems Analysis as an area of concentration. Students in these areas utilize Mgt 225 to satisfy the quantitative requirement.

† Not required in the Administration of Science and Technology area of concentration.

‡ Econ 217–18 may be used to satisfy the Econ 220 requirement and 3 semester hours of elective

AREAS OF CONCENTRATION

1. ADMINISTRATION OF SCIENCE AND TECHNOLOGY*

Faculty Advisers: Daniel D. Roman, Professor of Management Science; Government 400. Telephone 676-6678; Jack W. Waldrip, Assistant Professor of Business Administration; Building Y, Room 21, 2131 G Street, N.W., Telephone 676-7139.

Administration of Science and Technology replaces former Management Engineering and former Research and Development Management areas of concentration.

This new area of concentration provides a basic academic and professional foundation for the management of science and technology. The courses cover the management of research and development organizations; the implications of technological change and its effect on professional manpower; international science and technology, including technology forecasting, assessment, and transfer; and public policy toward science and technology.

		Semester Hours
Econ 217–18:	Survey of Economics	6
Mgt 224:	Theory and Management of Systems	3
†Mgt 225:	Managerial Statistics I	3
Mgt 230:	Administration of Research and Development	3
Mgt 239:	Seminar: Administration of Research and Development	3
PAd 235:	Technological Change and Manpower	3
PAd 262:	Seminar: Science, Technology, and Public Policy	3
	Total	24

2. BEHAVIORAL SCIENCES IN ORGANIZATION DEVELOPMENT

Faculty Advisers: Eric K. Winslow, Associate Professor of Behavioral Sciences, Government 201, Telephone 676-7375; Jerry Harvey, Associate Professor of Management Science, Building Y, Room 10, 2131 G Street, N.W., Telephone 676-6205.

This area of concentration reflects the assumption that the effective utilization of the behavioral sciences is concerned with both means and ends; that the specialist in behavioral science not only is skilled in theory and research but also applies his technical and specialized knowledge as a conscious force in effective organizational growth and improvement. Thus, courses are designed to equip the student with organizational concepts and behavioral skills appropriate to optimizing the utilization of a system's total resources.

This program is designed to fulfill the need for professionals capable of designing, creating, and developing the necessary behavioral and organizational systems appropriate to rapidly changing societies. Emphasis is on the interrelationships of such dimensions as motivation, leadership, problem-solving, organizational growth, and increased complexity of modern organizations and their effect upon the function of organizational development.

*Mgt 264 is waived in this area of concentration.
†Mgt 203 *Mathematics for Management* or the equivalent is prerequisite for this course.

		Semester Hours
		3
*Mgt 208:	Current Issues in Organizational Behavior	3
*Mgt 210:	Behavioral Factors in the Process of Change	3
*Mgt 212:	Organizational Development: Concepts and Methods	3
Mgt 224:	Theory and Management of Systems	3
*Mgt 262:	Seminar: Contemporary Administrative Theory	
Other Courses:	To be selected from the following as approved by the adviser	3
BAd 211:	Leadership and Executive Development	
Mgt 213:	Consultative Processes in Organizations	
Mgt 230:	Administration of Research and Development	
PAd 223:	Behavioral Factors in Large Organizations	
PAd 233:	Seminar: Manpower Development and Utilization	
	Total	18

III. BUSINESS FINANCIAL MANAGEMENT†

Faculty Adviser: Rodney W. Eldridge, Associate Professor of International Finance, Government 405, Telephone 676-6892.

This area of concentration provides a background in business budgeting, controllership, treasury, long-range planning, reporting, and financial management processes. Courses are designed to emphasize the planning, analysis, implementation, and controls necessary for making effective financial decisions.

		Semester Hours
		3
Acct 215:	Survey of Managerial Accounting	3
BAd 231:	Financial Decision-making	3
BAd 232:	Capital Resource Management	3
BAd 233:	International Business Finance	3
BAd 237:	Investment Analysis	3
‡Mgt 225:	Managerial Statistics I	
	Total	18

IV. GOVERNMENTAL ADMINISTRATION

Faculty Advisers: David S. Brown, Professor of Management, Government 302, Telephone 676-6295; Stephen R. Chitwood, Associate Professor of Public Administration, Government 310, Telephone 676-6064.

This area of concentration emphasizes policy formulation and administration in government. It provides the broad dimensions of public administration for those preparing for managerial responsibility in the public service.

		Semester Hours
		3
PAd 213:	Administration in Government	3
PAd 231:	Public Personnel Administration	3
PAd 251:	Governmental Budgeting	3
PAd 252:	Problems in Planning, Programming, and Budgeting	
PAd 260:	Policy Formulation and Administration	
	Total	15

* Offered only on campus.
† Mgt 204 is waived in this area of concentration.
‡ Mgt 203 *Mathematics for Management* or the equivalent is prerequisite for this course.

INDUSTRIAL PERSONNEL MANAGEMENT

Faculty Adviser: Joe L. Jessup, Professor of Business Administration; Government 400, Telephone 676-6068.

This area of concentration provides a basic academic and professional foundation, equipping the student for administrative responsibility in industrial personnel management. The courses cover the fields of personnel management, industrial relations, unionism, collective bargaining, labor relations, and manpower development and utilization.

		Semester Hours
BAd 208:	Personnel Management and Industrial Relations	3
BAd 209:	Seminar: Personnel Management	3
BAd 212:	Unionism and Collective Bargaining	3
BAd 213:	Current Issues in Unionism, Collective Bargaining, and Labor Relations	3
PAd 233:	Seminar: Manpower Development and Utilization	3
	Total	15

INFORMATION SYSTEMS TECHNOLOGY*

Faculty Advisers: John F. McCarthy, Jr., Associate Professor of Business Administration, Government 409. Telephone 676-7089; Walton E. Smith, Associate Professor of Management Science, Building Y, Room 22, 2131 G Street, N.W., Telephone 676-7159.

Information Systems Technology is a combination for former Automatic Data Processing and former Systems Management areas of concentration.

This new area of concentration is designed to provide a managerial understanding of the principles of manual, mechanical, and electronic information processing, including computer programming concepts, methods, and languages; an appreciation of the capabilities, limitations, and selection procedure of information processing equipment; a knowledge of all phases of management information systems development, implementation, and evaluation; and an understanding of the roles of both management and systems personnel in information technology. It also provides an appreciation of the role of information technology as a tool of management.

Students actually participate in the development of management information systems; in the selection of computer equipment; and in the installation, management, and evaluation of management information systems during class sessions.

		Semester Hours
Mgt 224:	Theory and Management of Systems	3
†Mgt 225:	Managerial Statistics I	3
Mgt 241:	Management Information Systems Development and Application	3
Mgt 242:	Comparative Computer Systems	3
Mgt 243:	Management of Information Technology	3
	Total	15

*Mgt 204 is waived in this area of concentration. Mgt 244 *Information Systems and Telecommunications* and Mgt 245 *Data Base Management* (3) are recommended electives for this area.

†Mgt 203 *Mathematics for Management* or the equivalent is prerequisite to this course.

VII. INTERNATIONAL COMMERCE

Faculty Adviser: Geza P. Lauter, Associate Professor of Business Administration; Government 404, Telephone 676-7374.

This area of concentration prepares students for careers in firms operating on a multinational basis or about to enter the international field; for careers in the federal government and in international agencies concerned with business, industry, and finance abroad; and for the commerce option of the Foreign Service Officer Examination.

		Semester Hours
BAd 233:	International Business Finance	3
BAd 248:	International Marketing	3
BAd 255:	International Business in Perspective	3
BAd 256:	Seminar: International Trade	3
BAd 257:	Operation of the Multinational Firm	3
	Total	15

VIII. MANAGERIAL ACCOUNTING

Faculty Adviser: Anthony J. Mastro, Professor of Accounting; Government 302, Telephone 676-6055.

This area of concentration provides a knowledge of interrelated systems of accounting in planning and control for management. Emphasis is on the requirements of management for accounting information with concern for general and corporate accounting principles to the extent related to the managerial accounting functions.

Acct 115 *Survey of Financial Accounting* or the equivalent is prerequisite to the Managerial Accounting area of concentration.

		Semester Hours
*Acct 215:	Survey of Managerial Accounting	3
Acct 262:	Business Income Taxation	3
Acct 276:	Management Planning and Control	3
Acct 295:	Seminar in Accounting	3
BAd 231:	Financial Decision-making	3
	Total	15

IX. OPERATIONS RESEARCH AND SYSTEMS ANALYSIS†

Faculty Adviser: William W. Hardgrave, Associate Professor of Management Science; Building Y, Room 20, 2131 G Street, N.W., Telephone 676-6852.

This area of concentration develops an understanding of quantitative approaches to problems of managerial control and decision-making. While the program will develop a competent background in basic mathematical theory associated with the various techniques, it is oriented towards applications of the techniques rather than their theoretical mathematical content.

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* If Acct 215 or an equivalent course has been taken prior to entrance into this program, students may substitute Acct 275 or 282.

† Mgt 204 is waived in this area of concentration.

		Semester Hours
*Mgt 225:	Managerial Statistics I	3
Mgt 226:	Managerial Statistics II	3
Mgt 227:	Mathematical Programming: Techniques and Applications	3
Mgt 228:	Techniques of Operations Research	3
Mgt 229:	Seminar: Management Science and Operations Research	3
Other courses:	To be selected from the following as approved by the adviser	6
BAd 225:	Seminar: Manufacturing Production	
Mgt 224:	Theory and Management of Systems	
Mgt 242:	Comparative Computer Systems	
	Total	21

X. PROCUREMENT AND CONTRACTING

Faculty Adviser: Stanley N. Sherman, Associate Professor of Business Administration; Government 312, Telephone 676-7462.

This area of concentration provides a basic academic and professional foundation, equipping the student for administrative responsibility in procurement and contracting. The courses cover industrial purchasing, procurement activities of the federal government, and contracting activities of vendors to the federal government.

		Semester Hours
BAd 279:	Purchasing and Materials Management	3
BAd 280:	Procurement and Contracting	3
BAd 282:	Government Contract Administration	3
BAd 283:	Pricing and Negotiation	3
BAd 285:	Systems Procurement and Project Management	3
	Total	15

XI. PUBLIC FINANCIAL MANAGEMENT AND BUDGETING

Faculty Adviser: Stephen R. Chitwood, Associate Professor of Public Administration; Government 310, Telephone 676-6064.

This area of concentration provides a broad foundation for work in governmental planning, programming, budgeting; and for controllership and related financial management activities. Its main stress is on financial processes and decision-making in the public service.

		Semester Hours
Acct 215:	Survey of Managerial Accounting	3
PAd 213:	Administration in Government	3
PAd 251:	Governmental Budgeting	3
PAd 252:	Problems in Planning, Programming, and Budgeting	3
	Total	12

*Mgt 203 *Mathematics for Management* or the equivalent is prerequisite for this course.

XII. PUBLIC PERSONNEL MANAGEMENT

Faculty Adviser: Irwin Dubinsky, Assistant Professor of Public Administration; Government 403, Telephone 676-7376.

This area of concentration provides a basic academic and professional foundation, equipping the student for administrative responsibility in public personnel management. The courses cover the federal administrative organization and process; principles, functions, and problems of personnel administration in the public service; unionism and collective bargaining; and manpower development and utilization.

	Semester Hours
BAd 212: Unionism and Collective Bargaining	3
PAd 213: Administration in Government	3
PAd 231: Public Personnel Administration	3
PAd 232: Problems in Public Personnel Management	3
PAd 233: Seminar: Manpower Development and Utilization	3
Total	15

ELECTIVES

Unless a student elects to write a thesis, he may select electives appropriate to his program from graduate courses offered by the School of Government and Business Administration. To choose electives from the courses offered by the School of Government and Business Administration or to choose them from other related departmental offerings in this University, the student must obtain the written approval of the faculty adviser prior to registration. A form for this purpose may be obtained from the Office of Counseling and Information Services, College of General Studies.

MASTER OF SCIENCE

The School of Engineering and Applied Science in cooperation with the National Aeronautics and Space Administration's Langley Research Center, Hampton, Virginia, has a graduate engineering program at NASA-Langley. NASA-Langley's extensive scientific and engineering facilities and equipment are available to students in this program.

The programs at NASA-Langley lead to the degrees of Master of Science and (by special permission of the appropriate department chairman) Doctor of Science in the fields of acoustics, aerospace engineering, computer-aided structural design, flight sciences, fluid mechanics, solid mechanics and materials engineering, thermal sciences, electrical engineering, and computer science. These programs are open to qualified NASA employees and area residents. With the approval of the instructor, courses may be taken in nondegree status.

The School of Engineering and Applied Science in cooperation with the Naval Ship Research and Development Center, Annapolis, Maryland, has a graduate engineering program leading to the degree of Master of Science in fields of materials science and systems science. The programs are open to qualified NSRDC employees and area residents.

The School of Engineering and Applied Science in cooperation with the Naval Ship Research and Development Center, Carderock, Maryland, has a

graduate engineering program leading to the degree of Master of Science in the field of ocean and marine engineering. The program is open to qualified NSRDC employees and area residents.

The School of Engineering and Applied Science has academic jurisdiction over these degree programs which are administered by the College of General Studies.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 17, and pages 21–22.

REQUIREMENTS FOR THE DEGREE

The minimum program consists of 24 semester hours of approved graduate courses and a Master's thesis (equivalent to 6 semester hours). The student may elect an optional program without a thesis which consists of a minimum of 33 semester hours of approved graduate courses. All Master's candidates are required to pass a Master's Comprehensive Examination. Students whose undergraduate study does not include necessary prerequisites may be required to take more than the minimum semester hours required.

Upon admission the student is assigned an adviser. Programs of study are determined by any prerequisites established and the requirements of the department in which the student wishes to study. The program of studies in preparation for the Master's Comprehensive Examination must be approved by the student's adviser and the appropriate department chairman.

SCHOLARSHIP

For Master's work, a minimum of 24 semester hours (for those who receive credit for a thesis) or 33 semester hours (for those who follow the optional program without a thesis) of graduate course work with the grade of *B* or higher is required for graduation. Students who receive two grades of *F*, or three grades below *B*, are barred from further enrollment in graduate courses and, ordinarily, will not be readmitted to graduate study. Students who receive the grade of *C* in one or two courses are required to take additional course work to make up the minimum semester hours of work with grades of *B*.

INCOMPLETE AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on pages 31–32.

Removing an Incomplete.—Although the grade of *I may* remain on the records for a maximum of one year, the instructor should normally set a much shorter period within which the uncompleted work must be made up. The grade of *I* cannot be removed by reregistering for the course here, or by taking its equivalent elsewhere. An "Incomplete" which is not removed within one calendar year is automatically changed to an *F*.

RESIDENCE

In general, a minimum of one year of full-time study, or the equivalent in part-

time study, must be completed in the School of Engineering and Applied Science.

MASTER'S THESIS

In those programs requiring a thesis, the degree candidate must submit an acceptable thesis to demonstrate his ability to make independent use of the knowledge and discipline of thought acquired and developed by graduate study, to furnish objective evidence of constructive power in a given field, and to demonstrate that he can communicate the results of his work in writing. Work of a suitable character for which the student has professional responsibility may be considered, whether done on or off campus, provided no significant amount of work is completed without faculty supervision.

As a part of registration for the thesis course 299, the candidate must submit to the appropriate department chairman (on the form obtainable at the School office) his thesis area, approved by his faculty adviser. He must submit his thesis title to the Dean, on the form available in the School office, at the beginning of the semester in which he expects to graduate. Registration in thesis 299–300 entitles the student, during such registration, to the advice of the member of the faculty under whom the thesis is to be written. He may consult his adviser, but the thesis is the exclusive responsibility of the student.

The thesis in final form must be submitted to the appropriate department chairman by the date stated in the calendar for the semester in which the candidate enrolls in thesis 300. In case a thesis is unfinished on the date specified, the student will be granted an additional semester and must pay the "Continuous Registration" fee (see page 35) unless he is registered for course work. If the preparation of the thesis extends beyond the three semesters, approval for an extension of time will be required and the student must reregister for thesis 300 and pay tuition as for a repeated course.

A thesis may be submitted in final form one time. The acceptability of the thesis is determined exclusively by the Master's Comprehensive Examination committee. If the thesis is unacceptable, the student's graduate status is terminated.

Printed copies of detailed regulations regarding the form and reproduction of the thesis are available in the Office of the School. Accepted theses, with accompanying drawings, become the property of the University and are deposited in the University Library, where the duplicate copies are bound and made available for circulation.

OPTIONAL MASTER'S PROGRAM WITHOUT A THESIS

The student may elect an optional program without a thesis which consists of a minimum of 33 semester hours of approved graduate courses.

MASTER'S COMPREHENSIVE EXAMINATION

After completing his prescribed program, the candidate must pass a Master's Comprehensive Examination, to demonstrate substantial understanding of principles and method and their use in the area of his interest. This Examination may be written, oral, or both. A graduate student who fails any portion of the Master's Comprehensive Examination on his first attempt may be examined one

ore time if approval is given by the appropriate Examining Committee. In e event of failure to complete the Examination satisfactorily, the student's raduate status terminates.

ME TO COMPLETE MASTER'S DEGREE REQUIREMENTS

full-time Master's candidate is allowed a maximum of three calendar years complete all degree requirements, from the date of his first graduate-student tus registration in prerequisite or graduate courses. A part-time Master's ndidate is allowed a maximum of five calendar years. The time limit does not ude any period of registration as an unclassified student before admission graduate student status, nor does it encompass any specified period spent on proved leave of absence. Readmission is required upon expiration of leave of sence under the conditions and requirements then prevailing.

Students who do not complete degree requirements within the allowed time e their graduate status terminated. They may be readmitted to graduate tus under conditions specified by the department chairman and approved by e Dean.

MASTER OF ENGINEERING ADMINISTRATION

The School of Engineering and Applied Science in cooperation with the Naval ection, Prince Georges Center Building, Maryland, the Naval Research Lab- ratory, Washington, District of Columbia, and the Naval Ordnance Station, ndianhead, Maryland, is in the developmental stage of offering a graduate rogram leading to the degree of Master of Engineering Administration. The rogram will be open to employees of these organizations and area residents. The School of Engineering and Applied Science has academic jurisdiction er this degree program which is administered by the College of General udies.



ADMISSION

For detailed information see "Admission as a Degree Candidate," page 17, and pages 21–22.

REQUIREMENTS FOR THE DEGREE

The requirements for the degree of Master of Engineering Administration are the same as those listed under the degree of Master of Science (see pages 75–77).

DOCTOR OF SCIENCE*

The Doctor of Science degree program offered by the School of Engineering and Applied Science is designed to prepare the student for a career of creative scholarship by providing a broad, balanced background of knowledge and guidance in the performance of research. It requires study of interrelated fields of learning as well as original research in the field of central interest. The doctoral program for each student is determined, on an individual basis, by the student and his adviser. Work for the doctoral degree must be done in residence on campus except when special permission is granted by the chairman of the department.

ADMISSION

For detailed information see "Admission as a Degree Candidate," page 17, and pages 22–23.

REQUIREMENTS FOR THE DEGREE

The program of study for the degree of Doctor of Science is divided into two stages. The first—made up of a study of interrelated fields of learning which supports the general area of research concentration—culminates in the qualifying examination. The second—composed of research investigation of a particular subject in a special field and the presentation of such research findings in a written dissertation—culminates in the final examination. The general requirements for the Doctor of Science degree are (1) a minimum of 30 semester hours of course work beyond the Master's degree in preparation for the qualifying examination; (2) a reading knowledge of one foreign language, preferably Russian; (3) the satisfactory completion of the qualifying examination; (4) a dissertation, equivalent to a minimum of 24 semester hours; and (5) the satisfactory passing of the final oral examination.

The candidate must submit to the appropriate department five complete copies of the dissertation and two original copies of an abstract (not to exceed 600 words) of his dissertation no later than the date specified in the calendar. One copy of the abstract is for inclusion in the announcement of the examination and one for reproduction by University Microfilms, Inc. One copy of the dissertation is also sent to University Microfilms, Inc.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation, preparation of the abstract, and services offered by Univer-

* Complete information on the Doctor of Science degree program is contained in the *School of Engineering and Applied Science* catalogue.

sity Microfilms, Inc., are available at the School Office. The successful candidate for the doctorate is required, before receiving his degree, to pay a fee to cover a part of the expense of printing the abstract of his dissertation, and for the basic service rendered by University Microfilms, Inc. Accepted dissertations, with accompanying drawings, become the property of the University and are deposited in the University Library where bound copies are available for circulation.

LANGUAGE REQUIREMENT

A doctoral student should maintain a broad outlook as he pursues his study, and therefore must have the capability of reading appropriate literature published in a foreign language. Accordingly, a reading knowledge of one foreign language, preferably Russian, must be demonstrated before admission to the qualifying examination. If the student wishes to satisfy this requirement with a language other than Russian, he must obtain the approval first of his doctoral adviser, then of his department chairman; permission to use a language other than Russian will be granted on the basis of its importance to the student's field of interest.

TOOL REQUIREMENT

In addition to the language requirement, an examination in a tool requirement (e.g. computer programming) may be established by the various departments.

SCHOLARSHIP

To be admitted to the qualifying examination, the doctoral student must achieve an over-all academic average of 3.20 on a scale of 4 (a grade of *A* equals 4 points; *B*, 3 points; *C*, 2 points; and *F*, 0 points). No doctoral student may receive more than two course grades below *B*. If he does receive more than two course grades below *B*, his graduate study is terminated and his further enrollment prohibited. Courses in which the student earns grades below *B* are not included in his total semester-hour requirement for the degree. In the event a student receives any grade below *B*, he is required to consult with his adviser for a review of his program of study and discussion of possible changes therein.

SPECIAL DEGREE PROGRAMS

MASTER OF ARTS IN SPECIAL STUDIES (Criminal Justice)

A new program of study leading to the degree of Master of Arts in Special Studies with a concentration in Criminal Justice is offered off campus by the Graduate School of Arts and Sciences. This indisciplinary degree program consists of study in criminology, forensic sciences, law, management science, psychology, and sociology, and is particularly appropriate for law enforcement personnel or for students considering a career in law enforcement. For further information, contact one of the following: Richard C. Allen, Chairman of the Department of Forensic Sciences, telephone 676–7390; the Office of the Dean

of the Graduate School of Arts and Sciences, telephone 676–6210; or College of General Studies Staff Members—Ralph I. DeBelles, Director of District of Columbia Credit Programs, telephone 676–7061; Douglas Carter, Director of Maryland Credit Programs, telephone 676–7022; John A. Morrow, Director of Virginia Credit Programs, telephone 676–7040.

MASTER OF ARTS IN SPECIAL STUDIES (Higher Education Affairs)

A new program of study leading to the degree of Master of Arts in Special Studies with a concentration in Higher Education Affairs is offered off campus by the Graduate School of Arts and Sciences. This degree program focuses on the role of the national organizations representing the field of higher education. The curriculum is designed to provide the participants with an increased awareness of trends in the field of higher education and the tools needed to increase the effectiveness of the various associations of which they are a part. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676–6210, or Ralph I. DeBelles, Director of District of Columbia Credit Programs, College of General Studies, telephone 676–7061.

MASTER OF ARTS IN SPECIAL STUDIES (Legislative Affairs)

A program of study leading to the degree of Master of Arts in Special Studies with a concentration in Legislative Affairs is offered off campus by the Graduate School of Arts and Sciences. The program, focusing on the Congress of the United States, includes course work in legislative theory and research, the processes of politics, and public policy analysis. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676–6210, or Harvey D. Snyder, Associate Director of District of Columbia Credit Programs, College of General Studies, telephone 676–7028.

MASTER OF ARTS IN SPECIAL STUDIES (Urban Learning)

The program of study leading to the degree of Master of Arts in Special Studies with a concentration in Urban Learning is offered off-campus by the Graduate School of Arts and Sciences. The curriculum is designed to improve the urban educator's and city teacher's understanding of the environment in which he or she operates, with emphasis on social problems. For further information, contact the Office of the Dean of the Graduate School of Arts and Sciences, telephone 676–6210, or William C. Shelton, Sr., Associate Director of District of Columbia Credit Programs, College of General Studies, telephone 676–7067.

MASTER OF SCIENCE IN ADMINISTRATION

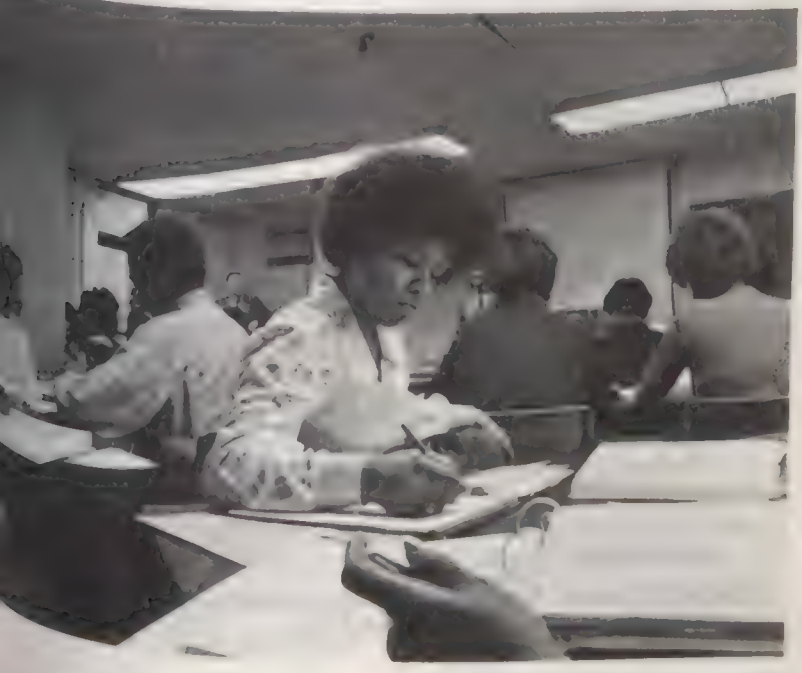
In cooperation with the Industrial College of the Armed Forces, Fort McNair, Washington, D.C., a program of study leading to the degree of Master of Science in Administration is offered by the School of Government and Business Administration. The program is open only to current students and faculty of the Industrial College of the Armed Forces. For further information, contact Harry R. Page, Faculty Adviser for the Industrial College of the Armed Forces Program, School of Government and Business Administration, telephone 676–7219, or Harvey D. Snyder, Associate Director of District of Columbia Credit Programs, College of General Studies, telephone 676–7028.

ASTER OF SCIENCE IN SPECIAL STUDIES (Oral Biology)

n cooperation with the Naval Graduate Dental School of the National Naval edical Center, and the Army Institute of Dental Research of the Walter eed Army Medical Center, a program of study leading to the degree of aster of Science in Special Studies with a concentration in Oral Biology is of- ered by the Graduate School of Arts and Sciences. The program is open to ental officers serving on active duty with the U.S. Armed Forces or with other ederal agencies. For further information, contact the Office of the Dean of the raduate School of Arts and Sciences, telephone 676–6210, or one of the fol- wing College of General Studies Staff Members—LeRoy S. Paul, Associate irector of District of Columbia Credit Programs, telephone 676–7062; Edward Wright, Associate Director of Maryland Credit Programs, telephone 676– 024.

ASTER OF SCIENCE IN SPECIAL STUDIES (Telecommunication Operations)

new program of study leading to the degree of Master of Science in Special udies with a concentration in Telecommunication Operations is offered off mpus by the Graduate School of Arts and Sciences. This program is de- gned to introduce personnel with technical backgrounds in communications related work in the field of business administration, economics, manage- nt science, political science, sociology, and statistics. For further infor- ation, contact the Office of the Dean of the Graduate School of Arts and ences, telephone 676–6210, or one of the following College of General Stud- Staff Members—LeRoy S. Paul, Associate Director of District of Columbia edit Programs, telephone 676–7062; Herbert K. Berthold, Associate Director Virginia Credit Programs, telephone 676–7014.



OFF-CAMPUS LOCATIONS OF THE COLLEGE OF GENERAL STUDIES

DISTRICT OF COLUMBIA

Bolling Air Force Base, Washington, D.C. 20332

Education Director: Edward Corbin
Office: Building 500
Telephone: 767-5348
Representative for the University: Harvey Snyder
Telephone: 676-7028
Open to military and civilian personnel

Federal After-hours Program

Representative for the University: Robert W. Stewart, Jr.
Telephone: 676-7018
Open to everyone

The following agencies participate in the Federal After-hours Program:

BUREAU OF CUSTOMS, WASHINGTON, D.C. 20226

Director: James J. Doherty, Training and Career Development
Office: 2100 K Street, N.W.
Telephone: 964-8000

BUREAU OF DOMESTIC AND INTERNATIONAL BUSINESS, WASHINGTON, D.C. 20230

Education Director: Bruce Robinson, Chief, Employee Development Branch
Office: Room 3525, Commerce Department Building, 14th Street and Constitution Avenue, N.W.
Telephone: 967-7075 or 967-7076

BUREAU OF NARCOTICS AND DANGEROUS DRUGS, WASHINGTON, D.C. 20573

Education Director: N.E. Bentson, Personnel Officer
Office: Room 605, 1405 Eye Street, N.W.
Telephone: 382-4231

CIVIL SERVICE COMMISSION, WASHINGTON, D.C. 20415

Anthony W. Hudson, Director of Personnel and Labor Relations
For information contact Employee Development Officer, Personnel Division
Office: Room 1679, 1900 E Street, N.W.
Telephone: 632-5400

COAST GUARD, WASHINGTON, D.C. 20591

W.I. Barry, Chief, Training Section, Headquarters Civilian Personnel Branch (CAS-5/81)
Office: Room 8114A, Nassif Building, 400 7th Street, S.W.
Telephone: 426-2342

DEPARTMENT OF JUSTICE, WASHINGTON, D.C. 20530

Education Director: Daniel Keenan, Chief, Career Development Section
Office: Room 1142, 10th Street and Pennsylvania Avenue, N.W.
Telephone: 739-3143

DEPARTMENT OF LABOR, WASHINGTON, D.C. 20210

Chief, Training and Development Group: Joseph Maas
For information contact Mrs. Carole Johnson
Office: Room 6141, 14th Street and Constitution Avenue, N.W.
Telephone: 961-2101

DEPARTMENT OF THE TREASURY, WASHINGTON, D.C. 20226

BUREAU OF ACCOUNTS

Education Director: Mrs. Pamela Carlson, Employee Development Specialist
Office: Room 112, Treasury Annex Number 1, Pennsylvania Avenue and Madison Place, N.W.
Telephone: 964-5565

DISTRICT OF COLUMBIA GOVERNMENT, WASHINGTON, D.C. 20001

Education Director: C. Howard Larson, Chief, Training and Career Development
Office: Room 215, 499 Pennsylvania Avenue, N.W.
Telephone: 629-2997

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C. 20591

Education Director: Mrs. Phyllis Burbank, Employee Development Specialist
Office: Room 510, 800 Independence Avenue, S.W.
Telephone: 426-3320

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C. 20554

Education Director: Thomas Tate
Office: Room 208, 1919 M Street, N.W.
Telephone: 632-6304 or 632-6385

FEDERAL RESERVE SYSTEM, WASHINGTON, D.C. 20551

Education Coordinator: Miss Sudelle Rice, Personnel Technician
Office: 20th Street and Constitution Avenue, N.W.
Telephone: 737-1100, Extension 404

GENERAL SERVICES ADMINISTRATION, WASHINGTON, D.C. 20405

Training Officer: Joel B. Gerstle
Office: Room 1142, 18th and F Streets, N.W.
Telephone: 343-4641 or 343-7681

INTERNAL REVENUE SERVICE, WASHINGTON, D.C. 20224

Education Director: D.C. Barry, Chief, National Office Training Branch
Office: Room 1311, 12th Street and Constitution Avenue, N.W.
Telephone: 964-6101

INTERSTATE COMMERCE COMMISSION, WASHINGTON, D.C. 20423

Education Director: Samuel D. Bingman, Jr., Training Officer
Office: Room 1420, 1200 Constitution Avenue, N.W.
Telephone: 737-9765, Extension 7116

NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C. 20550

Career Development and Training Officer: H.F. Blackner
Office: 1800 G Street, N.W.
Telephone: 632-4106

U.S. POSTAL SERVICE, WASHINGTON, D.C. 20260

Education Directors: Francis J. Mahaney; J.A. Matukonis, Training Division, Bureau of Personnel
Office: Room 205, 6900 Wisconsin Avenue, Chevy Chase, Md.
Telephone: 656-9125

VETERANS ADMINISTRATION, WASHINGTON, D.C. 20420

Education Directors: Raymond L. Butler, Chief, Employee Relations and Training Division; Philip L. Loomis, Assistant Chief, Employee Relations and Training Division
Office: Room 100, Veterans Administration Main Building, Vermont Avenue and H Street, N.W.
Telephone: 389-3101

Forrestal Building, L'Enfant Plaza, Washington, D.C. 20314

Education Director and Chairman of the Armed Forces Education and Training Advisory Council: Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 697-8015 or 697-2823
Program Coordinator: William H. Johnson
Office: Room GE222, Forrestal Building
Telephone: 693-8484 or 693-8485

Representative for the University: William C. Shelton, Sr.
Telephone: 676-7067
pen to active duty military personnel and Department of Defense civilians, and to ired military personnel and other federal employees.

Industrial College of the Armed Forces, Fort McNair, Washington, D.C. 20315

Director: Col. Edward Nacey, USAF
Office: Room 324, Industrial College of the Armed Forces
Telephone: 693-8698
Director for the University: Harry R. Page
Office: Room 302, Hall of Government, 710 21st Street, N.W.
Telephone: 676-6115
epresentative for the University: Harvey Snyder
Telephone: 676-7028
pen to students and faculty of the Industrial College of the Armed Forces

aval Research Laboratory, Washington, D.C. 20032

ducation Director: Carl Reinhardt
Office: 4555 Overlook Avenue, S.W.
Telephone: 767-2956
epresentative for the University: Harvey Snyder
Telephone: 676-7028

aval Security Station, 3801 Nebraska Avenue, N.W., Washington, D.C. 20390

ucation Services Officer: Gerald Maravetz
Telephone: 282-0860
NAVAL TELECOMMUNICATIONS COMMAND, 4401 MASSACHUSETTS AVENUE, N.W., WASHINGTON, D.C. 20370
epresentative for the University: LeRoy S. Paul
Telephone: 676-7062

ashington Navy Yard, Washington, D.C. 20374

ducation Services Specialist: LCDR Gloria Holmes, USN
Office: Building 92, Anacostia Naval Station
Telephone: 433-2033
mployee Development Officer: John Barber
Office: Room 202, Building 172, M and 9th Streets, S.E.
Telephone: 433-3188 or 433-3160
epresentative for the University: Harvey Snyder
Telephone: 676-7028
pen to government and nongovernment employees

ARYLAND

berdeen Edgewood, Md.

berdeen Area Education Director: John L. Lichi, Chief, Educational Services
ivision
Office: Building 3146, Army Education Center, Aberdeen Proving Ground, Md.
3005
elephone: (301) 278-3385

Edgewood Area Education Officer: Robert P. Mehr
Office: Building 4475, Edgewood Arsenal, Md. 21010
Telephone: (301) 671-2166
Representative for the University: Frank Dulong
Telephone: (202) 676-7029
Open to everyone by permission of the Commanding Officer of Aberdeen Proving Ground

Andrews Air Force Base, Washington, D.C. 20331

Education Director: John Clark
Office: Room 4, Building 3484
Telephone: 981-6377
Representative for the University: Robert R. Engle
Telephone: 676-7025
Open to military and civilian personnel of the Air Force and to others by permission

Defense Mapping Agency, Topographic Center, Bethesda, Md. 20315

Education Directors: Gene Hastings, Chief, Training and Development Division; John Rea, Development Specialist
Office: Erskine Hall, 6500 Brooks Lane
Telephone: 227-2147
Representative for the University: Edward B. Wright
Telephone: 676-7024
Open to employees of the Defense Mapping Agency, Topographic Center, and others by permission, obtained at least one week prior to the first week of classes, from the Training and Development Division, Telephone 227-2147

Edgewood Arsenal, Md. 21010 (see Aberdeen/Edgewood)

Fort George G. Meade, Md. 20755

Education Director: Robert Rambicur
Office: Building T393, Army Education Center
Telephone: (301) 677-6421
Representative for the University: Robert R. Engle
Telephone: (202) 676-7025
Open to everyone by permission of the Commanding Officer of Fort George G. Meade

National Naval Medical Center, Bethesda, Md. 20014

Education Director: J. Szabados, Head, Training and Educational Services
Office: Building 123
Telephone: 295-0493
Representative for the University: Edward B. Wright
Telephone: 676-7024
Open to military and civilian personnel of the Navy, employees of the National Institutes of Health, and to others as space permits

National Oceanic and Atmospheric Administration, Rockville, Md. 20852

Education Officer: Dan Bella
Office: Room 323, North Bethesda Office Center, 11820 Rockville Pike
Telephone: 496-8481

Representative for the University: Robert R. Engle
Telephone: 676-7025
Open to all employees of the Department of Commerce and to others by permission

Naval Academy, Annapolis, Md. 21402

Coordinator for the University Programs and Education Officer: William W. Jeffries, Archivist, U.S. Naval Academy
Office: Maury Hall
Telephone: (301) 267-7129
Representative for the University: Michael G. O'Connor
Telephone: (202) 676-7023
Open to everyone by permission of the Superintendent of the U.S. Naval Academy

Naval Air Station, Patuxent River, Md. 20670

Acting Director: Mrs. Wanda Denton, Employee Development Specialist
Office: Naval Building 463, Civilian Personnel Department
Telephone: (301) 863-3734 or 863-3735
Representative for the University: Edward B. Wright
Telephone: (202) 676-7024
Open to military and civilian personnel of the Navy and to others by permission

Naval Graduate Dental School, Bethesda, Md. 20014

Commanding Officer: RADM George D. Selfridge, DC, USN
Education Director: CAPT William B. Shreve, DC, USN
Office: Building 122
Telephone: 295-0064
Representative for the University: Edward B. Wright
Telephone: 676-7024
Open to military personnel assigned to duty and graduate study at the Naval Graduate Dental School

Naval School of Health Care Administration, Bethesda, Md. 20014

Commanding Officer: CAPT William J. Green, Jr., MSC, USN
Academic Director: CDR William Auton, MSC, USN
Office: Room 131, Building 141
Telephone: 295-1314
Representative for the University: Edward B. Wright
Telephone: 676-7024
Open to military personnel assigned to duty under instruction at the U.S. Naval School of Health Care Administration

Naval Ship Research and Development Center, Annapolis, Md. 21402

Education Director: Price Mosher
Office: Building 42, Training Center
Telephone: (301) 267-2475
Representative for the University: Michael G. O'Connor
Telephone: (202) 676-7023
Open to everyone by permission of the Officer in charge of the Center

Naval Ship Research and Development Center, Carderock, Md. 20007

Education Director: Mack A. Curtis, Head, Training Division
Office: Room 113A, Building 8
Telephone: 227-1204 or 227-1169
Representative for the University: Edward B. Wright
Telephone: 676-7024
Open to military personnel and civilian employees of the Naval Ship Research and Development Center and to others by permission

Naval Ships Engineering Command (see Prince Georges Center Building)

Parklawn Building, Rockville, Md. 20852

Education Officer: Edward O'Brian
Office: Room 18A03, 5600 Fishers Lane
Telephone: 443-1965
Representative for the University: Robert R. Engle
Telephone: 676-7025
Open to employees of the Department of Health, Education, and Welfare and to others by permission

Prince Georges Center Building (Naval Ships Engineering Center), Hyattsville, Md. 20788

Education Director: Ms. Doris B. Moore
Office: Room 118E, Civilian Personnel Office, 3700 East-West Highway
Telephone: 436-1104
Representative for the University: Robert R. Engle
Telephone: 676-7025
Open to everyone

Social Security Administration, Baltimore, Md. 21235

Director, Center for Continuing Education: Eric Levi
Office: Room 4-L-11, Annex Building, Division of Training and Career Development, 6401 Security Boulevard
Telephone: (301) 594-4529
Representative for the University: Frank Dulong
Telephone: (202) 676-7029
Open to employees of the Social Security Administration and to others by permission

VIRGINIA

Arlington Annex (Bureau of Naval Personnel), Arlington, Va. 20373

Education Director and Chairman of the Department of Defense Education and Training Advisory Council: Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 697-8015 or 697-2823
Program Coordinator: John K. Wilkerson, Head, Training and Incentive Awards Section
Office: Room 1710, Arlington Annex
Telephone: 694-1269
Representative for the University: William C. Robinson
Telephone: 676-7064
Open only to active duty and retired military personnel and all federal employees

Arlington Hall Station, Arlington, Va. 22212

Director, Army Education Center: James Rumpler
Office: Building 316
Telephone: 692-5450
Representative for the University: William C. Robinson
Telephone: 676-7064
Open only to active duty and retired military personnel and all federal employees

Bureau of Naval Personnel (See Arlington Annex)

CAPSO-Navy, Arlington, Va. 22203

Education Director: Donald E. Marquart
After-hours Coordinator: Mrs. Tanya Fogg
Office: Room 1111, Ballston Towers #2, 801 North Randolph Street
Telephone: 692-4476 or 692-4478
Employee Development Locations Served:
1. Ballston Towers #2, Room 1111, Mrs. Tanya Fogg, 692-4476
2. Jefferson Plaza, Room 158, Miss Mildred Stephens, 692-8524
3. Crystal Mall #3, Room 817, Miss Patricia McGinnis, 697-4530
4. National Center #2, Room 5W72, Miss Bobbie Ellerbee, 692-0307
5. National Center #3, Room 4E66, Art Casabiancia, 692-1237

Representative for the University: Michael G. O'Connor
Telephone: 676-7023
Open to military and civilian personnel of the Department of Defense and to others where space is available

Defense Communications Agency, 8th and South Courthouse Road, Arlington, Va. 22204

Education Director: Col. Arthur D. Hendricks, USA, Assistant to the Director for Personnel
Telephone: 692-1079
Representative for the University: Herbert K. Berthold
Telephone: 676-7014

Defense Supply Agency, Cameron Station, Alexandria, Va. 22314

Education Director: Philip C. Strang, Chief, Employee Development Branch
Office: Room 8A111
Telephone: 274-7493
Representative for the University: William C. Robinson
Telephone: 676-7064
Open to military and civilian personnel of the Department of Defense and to others upon permission

Falls Church High School, 7521 Jaguar Trail (entrance opposite Melpar Building, Arlington Boulevard), Falls Church, Va. 22046

Assistant Principal: Sal De Giorgi
Telephone: 573-4900
Representative for the University: Herbert K. Berthold
Telephone: 676-7014

Fort Belvoir, Va. 22060

Education Director: Eric Eber
Office: Building T-1483
Telephone: 664-3154 or 664-4546
Representative for the University: Michael G. O'Connor
Telephone: 676-7023
Open to military and civilian personnel of the Army and to others by permission

Fort Myer, Va. 22211

Education Director: Mrs. Elizabeth J. McGowan
Office: Building 604, South Area, Post Education Center
Telephone: 697-0607
Representative for the University: Elisabeth P. Clarkson
Telephone: 676-7026
Open to military and civilian personnel of the Army and to others by permission

Hoffman Building, 2461 Eisenhower Avenue, Alexandria, Va. 22314

Education Director and Chairman of the Department of Defense Education and Training Advisory Council: Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 697-8015 or 697-2823
Building Administrator: John Rice
Office: Room 124, Hoffman Building
Telephone: 325-0150
Representative for the University: William C. Robinson
Telephone: 676-7064
Open to active duty and retired military personnel and all federal employees

IBM Corporation, Components Division, 439 South Grant Avenue, Manassas, Va. 22110

Manager, Education Department: Marshall Gerstel
Telephone: (703) 367-3450
Representative for the University: Herbert K. Berthold
Telephone: (202) 676-7014

Langley Senior High School, McLean, Va. 22101

Richard W. Graves, Director, Student Activities
Telephone: 356-1960
Representative for the University: Herbert K. Berthold
Telephone: 676-7014
Open to everyone

Melpar Division of E-Systems, Inc., Falls Church, Va. 22046

Education Director: Anthony B. DePasquale, Personnel Relations Manager
Office: 7700 Arlington Boulevard
Telephone: 560-5000, Extension 2450

USA COMPUTER SYSTEMS COMMAND

Donald Anderson, Chief, Technical Services and Training Division
Office: Melpar Annex
Telephone: 756-5488
Representative for the University: Herbert K. Berthold
Telephone: 676-7014

Nassif Building, 5611 Columbia Pike, Falls Church, Va. 22041

Education Director and Chairman of the Department of Defense Education and Training Advisory Council: Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 697-8015 or 697-2823

MILITARY TRAFFIC MANAGEMENT AND TERMINAL SERVICE

Program Coordinator: Miss Beth Todd
Office: Room 734, Nassif Building
Telephone: 756-1088
Representative for the University: William C. Robinson
Telephone: 676-7064
Open to active duty and retired military personnel and all federal employees

The Pentagon, Washington, D.C. 20310

Director of the Pentagon Education Center, Chairman of the Armed Forces Education and Training Advisory Council, and Education Officer for the U.S. Army: Philip F. Strauss
Assistant to the Director: William H. Johnson
Office: Room 3C147, Pentagon
Telephone: 697-2823 or 697-6805 or 697-8015

U.S. AIR FORCE

Education Officer: Edwin Corbin
Office: Room 5E410, Pentagon
Telephone: 697-1863 or 697-7074
Representative for the University: William C. Robinson, Room 3C155, Pentagon
Pentagon Telephone: 697-3141
University Telephone: 676-7064
Open only to active duty and retired military personnel and all federal employees

Reston, Va. 22070

HERNDON HIGH SCHOOL, 200 BENNETT STREET, HERNDON, VA.
Martin Tait, Assistant Principal
Telephone: 437-6800
Representative for the University: Herbert K. Berthold
Telephone: 676-7014

U.S. Marine Corps Base, Quantico, Va. 22134

Education Officer: Major Wayne A. Babb, USMC
Office: Education Office, Building 2008
Telephone: (703) 640-2826

Representative for the University: Michael G. O'Connor
Telephone: (202) 676-7023
Open to military personnel and their dependents and civilian personnel attached to the Marine Corps Base. Others may be admitted by permission.

Vint Hill Farms Station, Warrenton, Va. 22186

Education Director: Eric Eber (Fort Belvoir)
Telephone: (703) 664-3154
Station Education Office
Telephone: (703) 347-6602
Representative for the University: Herbert K. Berthold
Telephone: (202) 676-7014
Open to everyone

Washington Air Route Traffic Control Center (FAA), Route 7, Leesburg, Va. 22075

Education Director: Willis F. Gee, Educational Planning and Development Office
Telephone: (703) 783-0745, Extension 216
Representative for the University: Herbert K. Berthold
Telephone: (202) 676-7014

Washington National Airport (FAA), Washington, D.C. 20001

Planning Development and Education Officer: William E. Freeman, Education and Training Office
Office: FAA Offices, Balcony, Main Terminal Building
Telephone: 557-2860 or 628-8781
Representative for the University: Elisabeth P. Clarkson
Telephone: 676-7026

OFF-CAMPUS LOCATIONS OF EDUCATION COURSES FOR TEACHERS

DISTRICT OF COLUMBIA PUBLIC SCHOOLS

James T. Guines, Associate Superintendent of Instructional Services
Office: Room 903, Presidential Building, 415 12th Street, N.W.
Telephone: 737-1062
Representative for the University: William C. Shelton, Sr.
Telephone: 676-7067

MARYLAND

Anne Arundel County Public Schools, Annapolis, Md. 21402

William Scott, Assistant in Personnel
Office: Anne Arundel County Board of Education, Green Street
Telephone: (301) 268-3345
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Baltimore City Public Schools, Baltimore, Md. 21218

Co-directors of Personnel: Marvin C. Davis, Kenneth Horvath
Office: 3 East 25th Street
Telephone: (301) 467-4000, Extension 451
Representative for the University: Frank Dulong
Telephone: (202) 676-7029

Caroline County Public Schools, Denton, Md. 21629

Fred C. Usilton, Director of Instruction
Office: Law Building, Market Street
Telephone: (301) 479-1460
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Charles Tri-County Center, Waldorf, Md. 20601

Maurice Dunkle, Program Counselor
Office: Thomas Stone High School
Telephone: (301) 843-6461
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

CALVERT COUNTY PUBLIC SCHOOLS, PRINCE FREDERICK, MD. 20678

David L. Brown, Supervisor of Personnel
Office: Calvert County School Board, Dares Beach Road
Telephone: (301) 535-1700

CHARLES COUNTY PUBLIC SCHOOLS, LA PLATA, MD. 20646

Elwood M. Leviner, Director of Personnel
Office: Charles County Board of Education, Health and Education Building
Telephone: (301) 934-4671

ST. MARY'S COUNTY PUBLIC SCHOOLS, LEONARDTOWN, MD. 20650

Kenneth D. Rigby, Assistant in Personnel
Office: St. Mary's County School Board of Health Building
Telephone: (301) 475-9141

Dorchester County Public Schools, Cambridge, Md. 21613

Lena T. Comer, Assistant Superintendent for Personnel
Office: 403 High Street
Telephone: (301) 228-4747
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Kent County Public Schools, Chestertown, Md. 21620

Robert J. Eckert, Director of Instructional Services
Office: 400 High Street
Telephone: (301) 778-1595
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Maryland State Department of Education, Millersville, Md. 21108

Donald Hall, Director of Training and Development Center
Office: Route 175
Telephone: (301) 923-3425
Representative for the University: Frank Dulong
Telephone: (202) 676-7029

Montgomery County Public Schools, Rockville, Md. 20850

Leonard M. Orloff, Director, Staff Development
Office: Montgomery County School Board, 850 North Washington Street
Telephone: 279-3444
Representative for the University: Anne O. Currier
Telephone: 676-7249

Prince Georges County Public Schools, Upper Marlboro, Md. 20870

Edward Turner, Director of Staff Development and In-service Training
Office: Prince Georges County School Board
Telephone: 627-4800, Extension 218
Representative for the University: Anne O. Currier
Telephone: 676-7249

Queen Anne County Public Schools, Centreville, Md. 21617

John H. Webb, Superintendent
Telephone: (301) 758-0855
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Talbot County Public Schools, Easton, Md. 21601

William F. Best, Assistant to the Superintendent
Office: Washington and Dover Streets
Telephone: (301) 822-0330
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

Wicomico County Public Schools, Salisbury, Md. 21801

William T. Middleton III, Director of Personnel
Office: Long Avenue and Mount Herman Road
Telephone: (301) 742-5128
Representative for the University: Anne O. Currier
Telephone: (202) 676-7249

VIRGINIA

Alexandria Public Schools, Alexandria, Va. 22301

Richard B. Hills, Staff Development Officer
Office: 418 South Washington Street
Telephone: 549-1390
Representatives for the University: Anne O. Currier,
Telephone: 676-7249; John A. Morrow, Telephone: 676-7040

Arlington County Public Schools, Arlington, Va. 22201

oseph Guter, Staff Development Officer
Office: 1426 North Quincy Street
Telephone: 558-2883
epresentatives for the University: Anne O. Currier,
Telephone: 676-7249; John A. Morrow, Telephone: 676-7040

Fairfax County Public Schools, Fairfax, Va. 22150

William C. Symons, Jr., Staff Development Officer
Office: 10700 Page Avenue
Telephone: 691-3209
epresentatives for the University: Anne O. Currier,
Telephone: 676-7249; John A. Morrow, Telephone: 676-7040

Falls Church City Public Schools, Falls Church, Va. 22043

mes Fox, Principal, George Mason High School
Office: 7124 Leesburg Pike
Telephone: 532-1329
epresentatives for the University: Anne O. Currier,
Telephone: 676-7249; John A. Morrow, Telephone: 676-7040

oudon County Public Schools, Leesburg, Va. 22075

n G. Sowards, Staff Development Officer
Josephine O. Ashton, Supervisor, Elementary Education
Office: Loudon County School Board, 20 Union Street
Telephone: (703) 777-2221
esentatives for the University: Anne O. Currier,
Telephone: (202) 676-7249; John A. Morrow, Telephone: (202) 676-7040

rince William County Public Schools, Manassas, Va. 22110

liam Helton, Director, Extension Education
Office: Tudor Lane
Telephone: (703) 791-3113
presentatives for the University: Anne O. Currier,
Telephone: (202) 676-7249; John A. Morrow, Telephone: (202) 676-7040

IDEWATER CENTER

ector, George Washington University Tidewater Center: Robert C. Sedwick
ffice: 2019 Cunningham Drive, Hampton, Va. 23666
elephone: (804) 838-8444
s to any qualified individual
s the cities in the Tidewater area of Virginia and the following military instal-
ns:

mp Elmore, Norfolk, Va. 23511

cation Officer: Capt. K.V. Cole, USMC
Telephone: (804) 444-6410

Fort Eustis, Va. 23604

Education Director: Michael A. Yannitello
Telephone: (804) 878-5508

Fort Lee, Va. 23801

General Education Director: Leland Slaydon
Telephone: (804) 734-2605

Fort Monroe, Va. 23351

Education Director: William R. Foley
Telephone: (804) 727-2454

Fort Story, Virginia Beach, Va. 23459

Education Director: E.F. Bolick
Telephone: (804) 428-1111, Extension 2151

Guided Missile School Fleet Anti-Air Warfare Training Center, Dam Neck, Virginia Beach, Va. 23461

Educational Adviser: W.R. Hudgins
Telephone: (804) 425-4473

Langley Air Force Base, Va. 23365

Education Services Officer: Robert J. Dewey
Telephone: (804) 764-5757

NASA-Langley Research Center, Langley Field, Hampton, Va. 23365

Head, Training and Education Services Branch: Malcolm P. Clark
Telephone: (804) 827-2611

Naval Air Station, Norfolk, Va. 23511

Educational Services Officer: Lt. Dan Martin, USN
Telephone: (804) 444-7694

Naval Air Station, Oceana, Virginia Beach, Va. 23460

Educational Services Officer: Lt.J.G. D.E. Oliver, USN
Telephone: (804) 425-2613

Naval Amphibious Base, Little Creek, Norfolk, Va. 23521

Educational Services Officer: Warrant Officer Leigh Henningsen, USN
Telephone: (804) 464-7811

Naval Supply Center, Norfolk, Va. 23512

Training Director: George Green
Telephone: (804) 444-4912

U.S. Atlantic Fleet, U.S. Naval Base, Norfolk, Va. 23511

Educational Services Officer: LCDR B.G.Windom, USN
Telephone: (804) 444-6945

U.S. Naval Regional Medical Center, Portsmouth, Va. 23708

Training Officer: CDR Harry P. Miller, USN
Telephone: (804) 397-6581, Extension 242

U.S. Naval Station, Norfolk, Va. 23511

Educational Director: Lt. J.P. Weining, USN
Telephone: (804) 444-7272



COURSES OF INSTRUCTION

ON THE FOLLOWING PAGES OF THIS CATALOGUE, under the alphabetically arranged names of the departments of instruction, are listed the courses of instruction. Courses carrying the designation "Campus Course" are normally offered only on campus. The courses are subject to change. The University reserves the right to withdraw any course announced.

EXPLANATION OF COURSE NUMBERS

COLLEGES AND SCHOOLS OTHER THAN ENGINEERING AND APPLIED SCIENCE

First-group courses.—Courses numbered from 1 to 100 are planned for students in the freshman and sophomore years. With the approval of the adviser and the dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisite to advanced courses, but they may not be credited toward a higher degree.

Second-group courses.—Courses numbered from 101 to 200 are planned for students in the junior and senior years. Except for Accounting courses they may be taken for graduate credit only upon the approval of the dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work in order to receive graduate credit.

Third-group courses.—Courses numbered above 200 are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are not open to other undergraduates. Qualified seniors registering for Accounting, Business Administration, Health Care Administration, Management Science, or Public Administration courses must have a 3.00 average, the prior approval of the department chairman who is responsible for the graduate course, the prior approval of the faculty adviser, and the prior approval of the Dean of the School of Government and Business Administration. Nondegree students who have not completed a Bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Courses numbered from 1 through 199 are planned for undergraduate credit, although certain courses may be taken for graduate credit when arrangements are approved in advance by the instructor and the Dean. Courses numbered 200 to 300 are planned for graduate credit and may in certain instances be taken by qualified undergraduate students. Courses numbered from 301 to 400 are primarily for doctoral students.

SEMESTER HOURS OF CREDIT

The number of semester hours of credit given for the satisfactory completion of a course is, in most cases, indicated in parentheses after the name of the course. Thus, a year course giving 3 hours of credit each semester is marked (3-3), and a semester course giving 3 hours of credit is marked (3). A semester hour usually consists of the completion of one fifty-minute period of class work or of one laboratory period a week for one semester.

ABBREVIATIONS

In the description of courses in this catalogue, the following abbreviations are used:

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anth	Anthropology
ApSc	Applied Science
Art	Art
BiSc	Biological Sciences
BAd	Business Administration
Cart	Cartography
Chem	Chemistry
CE	Civil Engineering
Chin	Chinese
Clas	Classics
CSci	Computer Science
Econ	Economics
Educ	Education
EE	Electrical Engineering
Engl	English
EAd	Engineering Administration
EngS	Engineering Science
Epid	Epidemiology and Environmental Health
FoxS	Forensic Sciences
Fren	French
Geod	Geodesy
Geog	Geography and Regional Science
Geol	Geology
Geop	Geophysics
Germ	Germanic Languages and Literatures
HCA	Health Care Administration
Hist	History
Ital	Italian
Jour	Journalism
LAm	Latin American Civilization
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineering
Micr	Microbiology
Mus	Music
Ocea	Oceanography
OR	Operations Research
Oral	Oral Biology
Phar	Pharmacology
Phil	Philosophy
PE	Physical Education, Health, and Recreation
Phys	Physics
Phyl	Physiology
PSc	Political Science
Psyc	Psychology
PAd	Public Administration
Rel	Religion
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
SpEd	Special Education
Sp&D	Speech and Drama
Stat	Statistics

Accounting

Chairman: A.J. Mastro, Professor of Accounting; Government 302, Telephone 676-6055

Accounting courses numbered below the 200 level may not be taken for graduate credit.

1–2 **Introductory Accounting** (3–3)

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communication of significant economic and financial data. Prerequisite to Acct 2: Acct 1. Students who have received credit for Acct 115 cannot receive credit for Acct 1–2.

101 **Cost and Budgetary Control** (3)

Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 215 cannot receive credit for Acct 101.

111 **Financial Statement Analysis** (3)

The analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2.

115 **Survey of Financial Accounting** (3)

Development, presentation, and interpretation of financial accounting data necessary to the management process. Students who have received credit for Acct 1–2 cannot receive credit for Acct 115.

121 **Intermediate Accounting** (3)

In-depth study of accounting functions and basic theory: acquisition of assets and services, income and equity accounting, preparation and analysis of financial statements. Prerequisite: Acct 1–2.

141 **Governmental Accounting** (3)

Appropriation, encumbrance, and fund accounting for governmental and institutional entities. Prerequisite: Acct 1–2.

144 **Federal Accounting** (3)

Accounting procedures in the federal government, with emphasis on agency-level accounts and accounting support for cost-based budgets. Prerequisite: Acct 141.

161 **Federal Income Taxation** (3)

Federal income tax concepts applicable to individuals and corporations, differences between tax accounting and financial accounting.

171 **Auditing** (3)

Principles and procedures of auditing: generally accepted auditing standards, internal control, audit objectives and reports, form-preparation-use of audit work papers, audit evidence. Prerequisite: Acct 121.

181 **Accounting Systems** (3)

Organization and use of accounting information: origination, classification, control, and reporting; development, design, and installation of accounting systems; accounting communication patterns. Prerequisite: Acct 101, 171.

191 **Advanced Accounting** (3)

Application of accounting theory to special areas: consolidated statements, business combinations, earnings per share, foreign exchange, price-level adjusted statements, source and application of funds. Prerequisite: Acct 121.

193 **Business Budgeting** (3)

Principles and procedures in the development, installation, and operation of a system of budgetary control to aid management. Prerequisite: Acct 1–2. Students who have received credit for Acct 101 cannot receive credit for Acct 193.

215 **Survey of Managerial Accounting** (3)

Study of the nature, analysis, and interpretation of accounting reports primarily from the management point of view. Prerequisite: Acct 1–2 or 115. Students who have received credit for Acct 101 cannot receive credit for Acct 215.

231 **Contemporary Accounting Theory** (3)

Accounting principles and concepts and recent theories concerned with the valuation and amortization of assets and determination of income. Prerequisite: 6 semester hours of accounting.

241 **Accounting and Related Disciplines** (3)

Interrelationships of accounting and behavioral sciences, economics, mathematical methods, operations research. Prerequisite: 6 semester hours of accounting.

262 **Business Income Taxation** (3)

Federal income tax concepts applicable to corporations, partnerships, and their owners; emphasis on tax planning factors in business decisions and tax research.

275 **Contemporary Auditing Theory and Procedures** (3)

Study of generally accepted auditing standards: internal control and internal auditing, application of statistical sampling to auditing, audit of electronic data processing systems. Prerequisite: Acct 1–2 or 115.

276 **Management Planning and Control** (3)

Integrative case study approach to management systems for planning, control, and decisions: value indices for organizational sub-units, transfer pricing, contemporary control systems, accounting framework and cycle. Prerequisite: Acct 1–2 or 115.

282 **Accounting Information Systems** (3)

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 1–2 or 115.

295 **Seminar in Accounting** (3)

Selected accounting studies: critical analysis and evaluation developed in seminar discussions and papers. Prerequisite: Acct 1–2 or 115.

American Civilization*

Director: B.M. Mergen, Assistant Professor of American Civilization, P-10, Telephone 676-6070

71–72 **Introduction to American Civilization** (3–3) (Campus Course)
Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance.

226 **Ethnic Identity and the Melting Pot** (3)
An approach to understanding American civilization through the study of some of its ethnic and racial groups. The methods will be interdisciplinary, using historical, literary, and sociological material.

271 **Seminar: Research and Teaching in American Civilization** (3)
Consideration of American studies as an area for research and teaching; introduction to bibliography.

Anatomy

Chairman: R.S. Snell, Professor of Anatomy and of Orthopaedic Surgery; Ross Hall, Telephone 331-6511

115 **Anatomy for Anesthetists** (3)

†207 **Surgical Anatomy of the Head and Neck** (2)
Gross dissection of the head and neck. Lectures and demonstrations on the development, histology, and neuroanatomy of these regions.

Anthropology

Chairman: R.L. Humphrey, Jr., Associate Professor of Anthropology; X-11, Telephone 676-6075

Departmental prerequisite: Anth 1–2 is prerequisite to all other courses in Anthropology except Anth 158 and 162. This prerequisite may be waived by permission of instructor.

1–2 **Introductory Anthropology** (3–3)
Anth 1: survey of man's origin, physical evolution, and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior.

153 **Psychological Anthropology** (3)
Relevance of psychological theories to human evolution and the cross-cultural study of personality. Cultural determinants of personality formation and mental health.

* Administered by the American Studies Program
† Open only to students in the program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology

154 **Mythology and Folklore** (3)

Traditional verbal expression of supernatural or social beliefs: metaphorical thought; verbal art.

155 **Primitive Religion** (3)

Conceptions of the supernatural in nonliterate societies. Examination of religious beliefs and practices. Emphasis on religious process and change.

157 **Primitive Social Organization** (3)

The analysis of the social organization of primitive peoples; kinship, economic, and political systems.

171 **Native Peoples of North America** (3)

Comparative study of Indian groups representative of each of the culture areas of the continent.

185 **Latin American Archaeology** (3)

The culture history of pre-Columbian Mexico and Central America from the Paleo-Indian period through the Spanish Conquest, emphasizing the origin and development of Latin American high civilizations.

201 **Seminar: the Nature and Scope of Anthropology** (3)

Survey of the development of anthropological thought; examination of the subject matter, methodology, and theoretical approaches of anthropology, especially as they relate to contemporary societies.

202 **Seminar: Recent Trends in Anthropology** (3)

Major topics of interest in contemporary anthropology since the mid-20th century will be taken up in order, stressing current journal and monograph materials.

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irman: W.A. MacDonald, Professor of Art and Archaeology; Stuart Basement ...ont), Telephone 676-6085

31–32 **Survey of Western Art** (3–3)

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art.

71–72 **Introduction to the Arts in America** (3–3)

Painting, sculpture, and architecture of America, with selected references to crafts and popular arts. Art 71: from Colonial beginnings to the Republican Age. Art 72: from early 19th century to the present.

109 **19th Century Art in Europe** (3)

Painting and sculpture.

110 **Contemporary Art** (3)

Painting and sculpture in 20th century Europe.

112 **Art of Egypt and the Ancient Orient** (3)

Study of the art of Mesopotamia, Anatolia, Egypt, and Persia.

113 **Baroque Art in Italy** (3)
Development of painting, sculpture, and architecture in 16th and 17th century Italy.

115 **Christian Iconography** (3)
Origins and development of Christian symbols and themes from early Christian to modern times.

117 **Medieval Art I** (3)
Architecture, sculpture, and painting of the early Christian and Byzantine periods.

120 **Art of China and Japan** (3)
Architecture, painting, and sculpture of China, Korea, and Japan.

141 **Interior Decoration** (3)
Principles of decoration dealing with furniture designs and ensemble layout, draperies, color, accessories, and lighting.

145 **Folk Arts in America** (3)
Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts.

146 **Principles of Museum Work** (3)
Introduction to the history and development of museums; problems of museum administration, connoisseurship, cataloguing, installation, conservation, and educational service.

155 **Etruscan Art and Archaeology** (6)
Art and Archaeology program in Italy.

156 **20th Century American Art** (3)
An examination and study of the wide range and variety of artistic expression in American painting, sculpture, and architecture from the late 19th century to the present. Given in conjunction with New York University Sunrise Semester program via TV. Off-campus credit only; credit not applicable to campus degree programs.

203 **Primitive Art** (3)
Arts of prehistoric and primitive man in Europe, pre-Columbian Americas, Oceania, and Africa.

242 **Etruscan Art and Archaeology** (6)
Art and Archaeology Program in Italy.

Biological Sciences

Chairman: A.H. Desmond, Professor of Zoology; Bell 314, Telephone 676-6090

BIOLOGY

3–4 **Introductory Biology for Nonscience Majors** (3–3) (Campus Course)
Lecture (2 hours), laboratory (2 hours). Survey of biological principles; emphasis on man as a functional organism in his environment. Prerequisite to BiSc 4: BiSc 3. Material fee, $12 a semester.

11–12 **Introductory Biology for Science Majors** (4–4) (Campus Course)

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Required of all prospective biology, botany, and zoology majors. Prerequisite to BiSc 12: BiSc 11. Material fee, $15 a semester.

Business Administration

Chairman: Guy Black, Professor of Business Economics; Government 302, Telephone 6-6115

51 **Introduction to Business** (3)

Structure, activities, and problems of business enterprise; its contribution to the individual and to society; careers in business.

101 **The Business Environment** (3)

Economic and legal environment of business enterprise; social and political influences; contemporary problems and issues.

102 **Fundamentals of Management** (3)

Planning, organizing, directing, coordinating, and controlling activities of the administrative unit; evolution of management thinking.

103 **Institutional Management** (3)

Philosophy of hospital administration: special services, food service, maintenance, internal review.

105 **Personnel Management** (3)

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities.

106 **Problems in Personnel Management** (3)

Principles and problems of personnel management and industrial relations illustrated by cases drawn from industry and government. Prerequisite: BAd 105.

107 **Collective Bargaining** (3)

American unionism and collective bargaining; economic, social, and public policy considerations. The negotiation and administration of collective bargaining agreements. Prerequisite: B Ad 105 or permission of instructor.

113 **Real Estate** (3)

Principles of urban real estate practice; leasing and property management, valuation, appraisal, financing, taxation, urban growth, urban renewal.

121 **Fundamentals of Insurance and Risk Management** (3)

Functions of insurance and risk management in business enterprise.

122 **Insurance Estate Planning** (3)

Insurance and estate programming, role of insurance in providing protection and estate development, disposition of the individual estate. Prerequisite: B Ad 121.

131 **Business Finance** (3)

Analyzing capital requirements and methods of acquiring funds; planning

efficient use of capital. Asset management, financial analysis, sources of funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51.

132 **International Business Finance** (3)
Principles, practices, problems, and institutions of international finance. Emphasis on international financial markets, exchange rates, balance-of-payments restraints, and governmental policies. Prerequisite: BAd 131.

138 **Investment and Portfolio Management** (3)
Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2, BAd 131.

141 **Basic Marketing Management** (3)
Marketing and marketing management, consumer and demand analysis, retailing, wholesaling. Emphasis on major decision areas and tools. Prerequisite: BAd 102, Econ 1–2.

143 **Marketing Research** (3)
Principles and practices of marketing research; emphasis on basic methods and techniques, sources and interpretation of data, and presentation of results. Prerequisite: BAd 141.

158 **Physical Distribution Management** (3)
Distribution from shipper's point of view: problems of plant location, inventory control, warehousing; traffic management emphasized, including private carriage. Prerequisite: Econ 1–2.

161 **Commercial Law** (3)
Fundamental concepts and principles of law encountered in business activity; contracts, bailments, agency, sales, negotiable instruments, bankruptcy, other topics. Basic legal considerations in business decision-making.

171 **Principles of Transportation** (3)
Impact of intercity transportation systems on society. Emphasis on modal differences in development, economic characteristics, and regulation. Prerequisite: Econ 1–2.

172 **Public Utilities** (3)
Legal and economic meaning of public utility concept; development, services, economic characteristics, rate-making, and regulation with emphasis on electric, gas, and telephone industries. Prerequisite: Econ 1–2.

173 **Transportation Systems Management** (3)
Comparative study, from the standpoint of various carrier modes, of management problems common to all modes of domestic and international transportation. Prerequisite: BAd 171, Econ 1–2.

174 **Urban Transportation** (3)
Problems of developing balanced transportation systems for urban areas—area needs, modal evaluation, cost effectiveness, finance, and marketing. Prerequisite: BAd 171, Econ 1–2; or equivalent.

175 **Introduction to International Business** (3)
(Formerly Introduction to Foreign Trade)
Physical movement of goods in international business; conditions essential for successful trading; export shipment, documentation, procedural problems. Emphasis on ocean marine insurance and export traffic management policy. Prerequisite: Econ 1–2.

178 **International Business Policy and Operations** (3)
Analysis of overseas projects according to purpose and type of organization; development and management of overseas operations in different world areas. Prerequisite: BAd 175 or permission of instructor.

181 **Manufacturing Production** (3)
Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from various process and fabrication industries. Prerequisite: Math 51, 52; Stat 51 or equivalent.

198 **Business Policy and Administration** (3)
Terminal undergraduate course in Business Administration. Integration of functional activities in arriving at over-all business policy decisions. Prerequisite: BAd 102, 105, 131, 141, 181.

202 **Relations of Government to Business** (3)
Regulatory and promotional activities of the government, independent regulatory agencies, antitrust activities, monetary and fiscal policy, regulation of labor-management relations.

208 **Personnel Management and Industrial Relations** (3)
Survey of personnel management practices and procedures, including labor-management relations.

209 **Seminar: Personnel Management** (3)
Industrial personnel and manpower management, research in advanced problems.

211 **Leadership and Executive Development** (3)
Theories of managerial leadership; issues and problems associated with leadership in large organizations and at higher management levels; executive selection and development. Prerequisite: Mgt 201 or permission of instructor.

212 **Unionism and Collective Bargaining** (3)
The American labor movement. Collective bargaining and the conduct of labor relations under collective bargaining agreements.

213 **Current Issues in Unionism, Collective Bargaining, and Labor Relations** (3)
Current problems and issues. Prerequisite: BAd 212.

225 **Seminar: Manufacturing Production** (3)
Production technology, including new processes, materials, products, equipment, and facilities. Implications of emerging technology in man-

aging the production function. Prerequisite: BAd 181 or permission of instructor.

231 **Financial Decision-making** (3)

Functions and objectives of financial management, asset management, problems of internal financial analysis, rate-of-return analysis, financial forecasting, problems of capital demand and supply. Prerequisite: Acct 115 or equivalent, BAd 131.

232 **Capital Resource Management** (3)

Problems of capital acquisition, costs, rationing, structure; dividend policy Prerequisite: BAd 231.

233 **International Business Finance** (3)

Analysis of problems in international business finance. Impact of the evolving international payments system on business. Prerequisite: BAd 131 or equivalent.

235 **Financial Management** (3)

Problems of financial management: planning financial structure, obtaining and managing capital, issuing and placing securities, administering income, security arrangements. Prerequisite: Acct 215, Mgt 201.

237 **Investment Analysis** (3)

Risk-reward analysis of security investments including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: BAd 131.

238 **Seminar: Investment and Portfolio Management** (3)

Portfolio management theory, application, and computer modeling. Independent research on investment analysis and portfolio management with emphasis on theory, cases, and computer applications. Prerequisite: BAd 237.

241 **Marketing Management** (3)

Marketing management problems: market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs.

243 **Seminar: Marketing Research** (3)

Research as an aid to decision-making and increased efficiency in marketing, marketing research process, critical appraisal of methods and results, applications.

248 **International Marketing** (3)

Organization for international marketing, demand analysis, product development and policies, marketing structure and trade channels, advertising and promotion problems and policies, pricing, and legal aspects. Effective international marketing strategy.

255 **International Business in Perspective** (3)

The nature and order of magnitude of international business; global patterns of trade and investment; international and national institutions; policy issues, trends.

256 **Seminar: International Trade** (3)

Classical and modern concepts of international trade theory, instruments and institutions of trade policy, barriers to trade, preferential treatment and trading blocs, trends and issues.

257 **Operation of the Multinational Firm** (3)

International market entry and expansion; operating policies, procedures, and problems of multinational companies; developing executives for international business. Prerequisite: advanced Master's degree standing.

261 **Managerial Microeconomics** (3)

Applications of economic theory and statistics to business decisions involving demand, production, cost, profits, investments, and inventories. Prerequisite: Econ 217, Mgt 203, Stat 111 and 112; or equivalent; or permission of instructor.

262 **Managerial Macroeconomics** (3)

Use of economic theory and statistics in business forecasting; interpretation of economic trends and developments; analysis of governmental economic policies. Prerequisite: Econ 218, Mgt 203, Stat 111 and 112; or equivalent; or permission of instructor.

275 **Seminar: Transportation** (3)

Problems and special areas of interest in transportation. Prerequisite: BAd 171 or permission of instructor.

279 **Purchasing and Materials Management** (3)

Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics.

280 **Procurement and Contracting** (3)

Overview of procurement and contracting; emphasis on federal government buying policies, practices, and procedures.

282 **Government Contract Administration** (3)

Surveillance and management of contract performance. Measurement of progress; specification interpretation; quality assurance; changes, negotiation, and adjustment; financial considerations; property; terminations; regulatory and policy concerns. Prerequisite: BAd 280 or permission of instructor.

283 **Pricing and Negotiation** (3)

Scope and objectives of negotiated procurement; preparation, conduct, and recording of negotiations; analysis of cost, price, profit, investment, and risk; cost principles; incentives; relationship of contract type to work requirements; techniques of negotiation. Prerequisite: BAd 280 or permission of instructor.

285 **Systems Procurement and Project Management** (3)

Development and procurement of major systems. Project management and its impact on the procurement process. Procurement planning. Prerequisite: BAd 280 or permission of instructor.

293 **Business Research** (3)

Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings. May be repeated once for credit.

297 **Business Policy Formulation** (3)
Analysis of operational situations and policy issues. Developing and implementing solutions to managerial problems. Prerequisite: advanced Master's degree standing.

299 **Thesis Seminar** (3) (Campus Course)
Examination of thesis standards, research philosophy and methodology.

300 **Thesis Research** (3)

Cartography*

Program Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science, Telephone 946-3557

1–2 **Introduction to Cartography** (3–3)
The use of maps. History of mapping. Introduction to the fundamental concepts of topography, hydrography, and cartography. Characteristics and uses of different kinds of maps and charts, symbolization, representation of relief, geographic and grid coordinates, attributes of various projections, reliability. Making maps. Fundamental concepts of geodesy and geomorphology as applied to maps and charts, surveying methods, application to aerial photography, photo interpretation, map design, compilation and reproduction. Prerequisite to Cart 2: Cart 1.

103–4 **Photo Interpretation** (3–3)
Photo interpretation and its uses. History of photo interpretation. Fundamental concepts of image interpretation, topography, hydrology, vegetation, and man-features. Parameters affecting photo interpretation. Civil and military interpretation. Measurements, keys, and diagnostic techniques: reliability. Infrared and radar photo interpretation. Satellite photography. Prerequisite or concurrent registration: Geod 17. Prerequisite to Cart 104: Cart 103.

107 **Physiography** (3)
Development of physiographic concepts; the earth's crust, weathering, climate, and denudation; stream, shore, wind, and ice processes; glaciation; physiographic regions. Prerequisite: Cart 2.

108 **Climatology** (3)
Introduction, causes for climate and weather, air mass movements, water mass movements, physical features of boundaries. Tropics, subtropics, humid and dry continentals, subarctics.

111 **Cartographic Techniques** (3)
State-of-the-art orientation in the techniques and procedures currently used in cartographic agencies, including field methods, evaluation of source maps, use of scribing and contact screens in color separation, shaded relief, map reproduction, and associated managerial practices. Prerequisite: Cart 2. Laboratory fee to be announced.

* Affiliated with the Department of Geography and Regional Science.

112 **Advanced Cartography** (3)

Automated cartography, including computer-assisted map compilation, statistical mapping, automated color separation, and revision systems. Aerospace cartography, including orbital navigation, lunar, and planetary charting. Prerequisite: Cart 111.

120 **Computer Mapping** (3)

Examination of the methods of quantitative computer mapping, drawing primarily on Symap and related statistical mapping programs. Students develop a clear understanding of computer mapping techniques and are provided the opportunity through practical exercises to apply these techniques to a variety of mapping situations. Prerequisite: Cart 2 or permission of instructor. Laboratory fee to be announced.

125 **Marine Cartography** (3)

Similarities and differences between land mapping and the charting of the marine environment; emphasis on the unique characteristics of the latter. Exploring the extended and imaginative symbology required to depict a visually opaque environment characterized by sparsity of data; the thematic aspects of oceanography charting investigated with detailed analysis of tri-dimensional data shown in bi-dimensional form; certain mathematical concepts of projection and chart design. Prerequisite: Cart 2 or permission of instructor.

130 **Remote Sensing** (3)

Basic theory and application of remote sensing and the principle types of instrumentation, including geometric and radimetric calibration, data management, automatic and interactive data interpretation, and selected application. Use of orbital systems is considered together with the cartographic treatment of images.

hemistry

rman: A.D. Britt, Associate Professor of Chemistry, Corcoran 104, Telephone 6120

YSICAL SCIENCE

3–4 **Contemporary Science** (3–3) (Campus Course)
(Formerly Fundamentals of Physical Science)
For nonscience majors. Lecture (2 hours), laboratory (3 hours). Contemporary topics from the physical sciences are integrated to introduce the nonscience major to the basic methods and achievements of physical science. Laboratory fee, $15 a semester.

5–6 **Contemporary Science** (4–4)

Nonlaboratory course for off-campus students only. Survey covering topics in contemporary science: population control, pollution, drugs, food additives, etc.

MISTRY

11–12 **General Chemistry** (4–4) (Campus Course)
Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary

course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $21 a semester.

Chinese*

Chairman: Chung-wen Shih, Professor of Chinese; Library 613, Telephone 676-7100

1–2 **Beginning Mandarin Chinese, Level I** (3–3) (Campus Course)
Classroom (3 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 2: Chin 1. Laboratory fee, $17.50 a semester.

3–4 **Beginning Mandarin Chinese, Level II** (3–3) (Campus Course)
Classroom (3 hours), laboratory (1 hour). Continuation of grammar and spoken Chinese with more emphasis on the written language and reading. Prerequisite to Chin 3: Chin 2 or equivalent. Prerequisite to Chin 4: Chin 3. Laboratory fee, $17.50 a semester.

Economics

Chairman: C.T. Stewart, Jr., Professor of Economics; C-617, Telephone 676-6150

Departmental prerequisite: Except for Econ 217–18 and 220, Econ 1–2 is prerequisite to all other courses in Economics.

1–2 **Principles of Economics** (3–3)
Lecture (2 hours), recitation (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1 is prerequisite to Econ 2.

121 **Money and Banking** (3)
Nature of money, credit, commercial banking, and other financial institutions in the U.S. monetary system.

217–18 **Survey of Economics** (3–3)
For graduate students in fields other than economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived.

220 **Survey of Principles and Issues in Economics** (3)
For students in the Master of Science in Administration degree program. Survey of economic theory and its application to contemporary economic problems. Departmental prerequisite waived.

241 **Labor Economics** (3)
Analysis of labor markets, theories of wages, impact of collective bargaining, causes of unemployment, public policies and programs.

* Administered by the Department of East Asian Languages and Literatures.

243 **Seminar: Manpower Policy** (3)

Developments leading to expansion of public investment in manpower resources; evaluation of goals and operations of publicly supported programs.

253 **Productivity Analysis** (3)

Concepts, measurement, and analysis of productivity in business and government at aggregate and organizational levels.

ducation

rman: Donald Linkowski, Associate Professor of Education; C-514, Telephone 6940

Departmental prerequisite: A degree from an accredited institution and adequate professional preparation are prerequisite to courses in Education numbered 201 to 400.

112 **Educational Measurement** (3)

Scope, needs, services to students, selection and construction of teacher-made tests, interpretation of tests for evidence purposes. Prerequisite: Educ 108 and 123.

128 **Children's Literature** (3)

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development, children's original expressions.

205–6 **The Curriculum** (3–3)

For experienced teachers. Educ 205: curriculum foundations and issues, comparison of curriculum patterns. Educ 206: curriculum development in subject areas, group consideration of student problems.

207 **Curriculum Materials** (3 to 6)

For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations.

208 **Human Development** (3)

Consideration of human development and behavior throughout the life span; emphasis on practical implications of relevant interdisciplinary research.

209 **Child Development** (3)

Interdisciplinary approach to child development and behavior. Practical implications of research in disciplines contributing to knowledge about childhood.

210 **Adolescent Development** (3)

Interdisciplinary approach to adolescent development and behavior. Practical implications of research in disciplines contributing to knowledge about adolescence.

212 **Quantitative Methods I: Measurement** (3)
(Formerly Educational Measurement)
Basic measurement techniques; selection, administration, and interpretation of standardized tests; construction, selection, and interpretation of questionnaires, personality inventories, and other data-gathering instruments used in research.

213–14 **History of Education** (3–3)
Educ 213: European backgrounds of American education. Educ 214: evolution of the American school system.

216 **Education of Slow-learning Children** (3)
Identification, nature, and needs of slow-learning elementary and junior high school children. Emphasis on diagnosis and treatment of learning difficulties.

217–18 **Philosophy of Education** (3–3)
Educ 217: to help students formulate a personal philosophy of education. Educ 218: social foundations of education—forces that shape policies and offerings of the school.

219 **Elementary School Classroom Procedures** (3)
Current theories of teaching and learning and their application to teaching acts and strategies of elementary school teachers.

223 **Foundations of Reading Instruction** (3)
Historical and psychological background; evaluation of recent methods, materials, and techniques in teaching reading; demonstrations of diagnostic and teaching techniques.

224 **Reading Problems** (3)
Elementary school reading difficulties; classroom and clinical techniques in testing and teaching. Prerequisite: one or more years of recent teaching experience and a previous course in reading or language arts.

226 **Reading in Secondary School and College** (3)
Methods, techniques, and materials necessary for developing efficient reading skills, including skills in content subjects; organizing and evaluating reading programs.

227 **Basic Issues in Elementary Education** (3)
Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school.

228 **Instructional Areas in Elementary Education** (3)
Current trends and research on reading, language arts, social studies, mathematics, science, music, art, and physical education.

229 **Administration of Elementary Education** (3)
For experienced teachers and administrators. Achieving instructional objectives, organizing and servicing teaching activities, coordinating school and community life.

231 **Secondary School Classroom Procedures** (3)
Current classroom practices: teacher-pupil planning, group procedures,

initiatory and culminating activities, individual and group evaluation techniques, teaching aids, etc.; review of recent literature.

232 **Supervision of Elementary Education** (3)

For experienced teachers and administrators with two or more years of teaching experience. Review of modern supervisory concepts, including practices in the operation of the elementary school.

233 **Audio-visual Education** (3)

Lecture (2 hours), laboratory (1 hour). Selection, evaluation, and use of audio-visual materials; administrative problems in care, operation, maintenance, and use of such materials and equipment. Material fee, $7.

235 **Analysis of Teaching** (3)

Techniques of analyzing teaching styles and classroom interactions.

236 **Introduction to Education Technology** (3)

Consideration of historical perspective, process, instrumentation, and implementation of self-instructional systems.

237 **Systems Approach to Instructional Design** (3)

Application of systems techniques to the development of an instructional program.

241 **Education of the Gifted** (3)

For classroom teachers. Nature and discovery of giftedness, provisions for the gifted in regular classes, experimental projects.

243 **Human Relations in Education** (3)

Principles and practices in human relations between and among learner, teacher, other school personnel, and parents.

245 **School and Community** (3)

The school as an important member of a team of social agencies that builds the community.

247 **Adult and Preprofessional Technical and Occupational Education** (3)
(Formerly Adult Occupational Education)

Development, current concepts, agencies involved, problems, and trends in adult vocational-technical-occupational education in the United States and foreign countries.

250 **Counseling Drug Abusers** (3)

Counseling theory and practice applied to drug abusers. Crisis intervention, self-help groups, and family therapy; individual and group counseling.

251 **Foundations of Guidance and Personnel Services** (3)

Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues.

252 **Organization and Administration of Guidance Services** (3)

Procedure and practice in organizing and administering school guidance and pupil personnel programs. Admission by permission of instructor.

253 **Analysis of the Individual for Purposes of Counseling** (3)
Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: Educ 212 or equivalent.

254 **The Middle School** (3)
Development, organization, and practices; emphasis on the learner, the teacher, the administrator, the curriculum, and the setting of the school for the preadolescent.

255–56 **Secondary Education** (3–3)
Examination of historical, psychological, sociological, and philosophical bases; emphasis on prescriptive implications. Special attention to contemporary problems and practices.

257 **Educational and Occupational Development** (3)
Theories of career development; factors influencing the world of work, procedures for evaluating and using socio-personal, educational, and occupational information.

258 **Techniques of Counseling** (3)
Theories and practices of vocational, educational, and personal counseling. Prerequisite: 12 semester hours in guidance and counseling, including Educ 253 and 257.

259 **Secondary School Administration** (3)
For experienced teachers and administrators. Survey of administration, including practices of the modern high school.

260 **Secondary School Supervision** (3)
For experienced teachers and administrators. Review of modern supervisory concepts, including practices in schools.

263 **Human Resource Development: Training and Education** (3)
Concepts and purpose, historical backgrounds, emerging roles of human resource development personnel, program areas. Prerequisite: adequate professional preparation or experience in training, education, and development.

264 **Program Planning in Human Resource Development** (3)
Training, education, and development programs for various client systems will be planned using critical events conceptual model. Field work. Prerequisite: Educ 263 and permission of instructor.

269–70 **School Business Management** (3–3)
Educ 269: philosophy, responsibilities, and functions of the business management office in public education institutions. Educ 270: practicum in educational business management.

271 **The Teacher and School Administration** (3)
Role of federal, state, and local administrative units; school finance; legal controls; school plant; public support; improving teaching conditions.

272 **The Teacher and School Supervision** (3)
Nature, organization, human relationships, and techniques.

275 **Seminar: School Finance** (3)

Educational financial theory, practice, and control, including methods of financing.

276 **Seminar: Public Relations in School Administration** (3)

Purposes, gathering materials, disseminating agencies, publicity media, public participation in policy-making.

278 **School Law** (3)

Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group.

283 **Higher Education in the United States** (3)

Development, scope, purpose, present status, programs, and trends in higher education in the United States.

284 **Administration of Higher Education** (3)

Government, organization, and administration of colleges and universities; duties of trustees and administrators.

285 **Student Activities** (3)

Nature and purposes of selected activities—homeroom, clubs, assemblies, school publications, student council, interscholastic contest; attention to sponsorship, participation, finance, and evaluation.

291 **Planning the School Plant** (3)

Selection of sites; evaluation of existing buildings; utilization of present facilities; adaptation to curricular needs; building, operation, and maintenance problems.

293–94 **Research and Independent Study** (3–3)

Individual research under guidance of a staff member. Program and conferences arranged with an instructor.

295 **Quantitative Methods II: Research Procedures** (3)

(Formerly Research Methods and Procedures)

Required of all candidates for graduate degrees in Education. Analysis of scientific approaches to problems in education; evaluation of research techniques. Prerequisite: Educ 212 or equivalent.

297 **Personnel Administration** (3)

Organization and administration of personnel programs for educational institutions. Basic philosophy, principles, responsibilities, and functions.

298 **Seminar: Personnel Administration** (3)

Research: policies, rules and regulations, staff organizations, negotiations.

299–300 **Thesis Research** (3–3)

Required of M.A. in Ed. degree candidates writing Master's theses.

316 **Curriculum Developments in Elementary School Social Studies** (3 to 6)

For experienced educational personnel. Research, techniques, materials,

and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor.

317 **Curriculum Developments in Elementary School Science** (3 to 6)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor.

320 **Curriculum Developments in Elementary School Mathematics** (3 to 6)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor.

354 **Counseling of Minority Groups** (3)

Consideration of problems and approaches related to counseling cultural and racial minorities in American society; emphasis on counseling the disadvantaged in urban areas.

355 **Counseling in Groups** (3)

Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling.

357 **Mental Hygiene** (3)

Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents.

370 **College Students and Their Community** (3)

Survey of literature on the characteristics, behavior, and attitudes of the contemporary college student; college student interaction with his environment. Admission by permission of instructor.

371 **Introduction to College Teaching** (3)

General principles, methods, techniques, and experimental instructional media for teaching at the college and university level.

372 **Internship in College Teaching** (3 to 6)

Supervised experience in a selected area of college teaching. Prerequisite: Educ 371. Admission by permission of instructor.

373 **The Junior-Community College** (3)

The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges.

374 **Current Issues in Higher Education** (3)

Prerequisite: Educ 283, 284.

375 **Foundations of a College Student Development Program** (3)

College student development as an integral part of higher education programs.

380 **Sensitivity Training: Laboratory Method** (3)

A sensitivity learning experience in human relations using unstructured group experience, individual feedback, experimentation, and practice. Admission by permission of Department, prior to registration.

381 **Adult Learning** (3)
(Formerly The Adult as a Learner)
Learning theories as applied to adults in individual and group learning transactions; effect of age on learning; psychological, physical, and social environment in adult education situation.

382 **Methods and Techniques of Adult Learning** (3)
(Formerly Methods in Adult Education)
Methods, techniques, and devices for adult learning; developing action-oriented learning situations in adult learning.

383 **Counseling of Adults** (3)
Theories and practical applications of personal counseling, emphasizing distinct needs of adult and young adults in organizational settings; primarily intended for counselors in military, government, business, and industry.

384 **Evaluation of Adult Learning Programs** (3)
(Formerly Evaluation of Adult Education)
Measurement and evaluation of adult learning programs in school and nonschool agencies—business, industry, government, voluntary organization, and community.

386 **Current Issues in Adult Learning Programs** (3)
(Formerly Current Issues in Adult Education)
For M.A. in Ed. degree candidates. Current issues and trends in the fields of adult education and human resource development. Admission by permission of instructor.

387 **Administration of Adult Learning Programs** (3)
(Formerly Administration of Adult Education)
Program administration, staff recruitment and development, fiscal operations, facilities, and maintenance of effective community relations.

389 **Consultant-Client Relationship in Human Resource Development** (3)
Examination of the consulting process, consultant-client behaviors, and dilemmas using theory and field experience. Prerequisite: Educ 264, 280 *Program Planning in Adult Education (3)*; or approval of instructor.

390 **Legal Problems in Higher Education** (3)
Investigation of legal problems in higher education related to administration, students, faculty, and academic program.

391 **College and University Curriculum** (3)
Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum.

392 **Financing Higher Education** (3)
Analysis of private, state, and federal revenue sources; student aid, program budgets, and financial methods and practices.

393 **Practicum in Higher Education** (3 to 6)
Supervised field experiences in higher education; reports and conferences. Admission by permission of instructor.

394 **College and University Governance** (3)
Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 284.

395 **Problems and Practices in School Administrative Organization** (3 to 6)
Application of principles and practices concerned with change and evaluation of educational administration.

399 **Seminar: Applied Educational Administration** (3 to 6)
Application of the theories and principles of administration to the public schools. Student participation with guidance by recognized regional practitioners.

400 **Special Workshop in Education** (arr.)
Topics to be announced in *Schedule of Classes*. May be repeated for credit.

Engineering and Applied Science

Coordinator of NASA-Langley Graduate Program: S.W. Yuan, Professor of Engineering and Applied Science, Tompkins 118, Telephone 676-6749
Program Adviser of Naval Ship Research and Development Center, Carderock, Md. J.E. Feir, Professor of Civil Engineering, Tompkins 109, Telephone 676-7526
Program Adviser of Naval Ship Research and Development Center, Annapolis, Md. S.W. Yuan, Professor of Engineering and Applied Science, Tompkins 118, Telephone 676-6749

APPLIED SCIENCE

115 **Engineering Analysis III** (3)
(Formerly Probabilistic and Statistical Methods in Engineering)
Solution of engineering problems using concepts from probability and statistics, including random variables, distribution functions, mathematical expectation, point and confidence interval estimation, hypothesis testing, correlation, and regression. This methodology applied to problems of structural design, bioengineering, manufacturing processes, product quality, equipment reliability, engineering management, and societal engineering. Prerequisite: Math 32.

211 **Analytical Methods in Engineering I** (3)
(Formerly Mathematical Methods in Applied Science I)
Engineering applications of the theory of complex variables including contour integration, conformal mapping, inversion, integral and boundary-value problems. Prerequisite: approval of Department.

212 **Analytical Methods in Engineering II** (3)
(Formerly Mathematical Methods in Applied Science II)
Analytical methods appropriate to the formulation of engineering problems including finite dimensional vector spaces, eigenvalue problems, generalized Fourier series, tensor calculus, curvilinear coordinates. Prerequisite: approval of Department.

213 **Analytical Methods in Engineering III** (3)
(Formerly Mathematical Methods in Applied Science III)
Analytical techniques applied to engineering problems involving wave propagation, diffusion processes, and potential distributions. Prerequisite: approval of Department.

214 **Analytical Methods in Engineering IV** (3)
(Formerly Mathematical Methods in Applied Science IV)
Introduction to variational methods in engineering including Ritz and Galerkin approximation methods for boundary-value problems. Aspects of linear integral equations arising from engineering analysis. Prerequisite: approval of Department.

215 **Special Topics in Engineering Analysis** (3)
(Formerly Mathematical Methods in Applied Science V)
Selected topics such as (1) perturbation techniques applied to approximate solution of nonlinear boundary- and initial-value problems in continuum mechanics; (2) advanced methods in the solution of boundary- and initial-value problems of engineering physics, including characteristics and Green's functions; or (3) singular integral equations with engineering applications. Prerequisite: approval of Department.

IVIL ENGINEERING

168 **Introductory Soil Mechanics** (3)
Engineering properties of soils; analysis of lateral earth pressures, bearing capacity, foundations, and slope stability. Prerequisite: CE 120 *Introduction to the Mechanics of Solids* (4) and ME 126 *Fluid Mechanics* (3).

191 **Metal Structures** (3)
Principles of the design of metal structures; structural elements; connections; specific problems of analysis; methods of construction.

192 **Reinforced Concrete Structures** (3)
Principles of the design of reinforced concrete structures. Details of reinforcement of structural elements. Monolithic structures, precast elements, methods of construction.

201 **Design of Metal Structures** (3)
Structural behavior and failure of metal structures; conception and design of structural systems for various cases, including low- and high-rise buildings, long-span structures, bridges, suspended roofs, and special structures. Prerequisite: CE 191 or equivalent.

202 **Design of Reinforced Concrete Structures** (3)
Modes of failure of reinforced concrete structures; selection of appropriate structural system; design of slabs, frames, folded plate roofs, shell structures, and other special structures. Prerequisite: CE 192 or equivalent.

203 **Prestressed Concrete Structures** (3)
Structural behavior and failure modes of prestressed concrete structures; design in prestressed concrete, including long-span structures, bridges, and precast systems. Prerequisite: CE 202 or equivalent.

206 **Foundation Engineering** (3)

Principles of soil mechanics and structural mechanics applied to the analysis and design of spread footings and mat foundations, pile foundations, retaining structures, including sheeting and bracing systems, and waterfront structures. Problems associated with subsurface exploration, dewatering, excavations, and underpinning. Prerequisite: CE 182 *Foundation Engineering* (2) and CE 204 *Applied Soil Mechanics I* (3); or equivalent.

253 **Failure and Reliability Analysis of Engineering Structures** (3)

Operational and structural failure mechanisms; instability, fracture, and fatigue. Operational and structural safety, probability of failure. Aspects of probabilistic structural analysis, statistics of extremes, risk and reliability, optimal design criteria. Prerequisite: ApSc 115 or equivalent.

254 **Special Topics in Structural Engineering** (3)

(Formerly Special Topics in Structural Mechanics)

Selected problems in structural mechanics and design: (1) thermal stresses in structural systems, (2) advanced probabilistic structural mechanics, (3) structural design for dynamic loads, (4) structural design for repeated loads, or (5) structural synthesis and optimization. May be repeated for credit. Prerequisite: CE 201 or 202, and CE 210 *Methods of Structural Analysis* (3), and approval of Department. Topic to be announced in the *Schedule of Classes.*

255 **Coastal Processes** (3)

Longshore currents and nearshore circulation; coastal sediment properties and analysis, longshore transport processes and rates; sediment budget; response of beaches to wave action and structures; tidal inlets, mechanical bypassing; beach nourishment; wind transport of sandy dune stabilization, sediment tracing. Prerequisite: approval of Department.

258 **Harbor and Coastal Engineering II** (3)

Interaction between structures and waves. Analysis and design of flexible structures; piers, jetties, and protective structures; off-shore drilling platforms. Design criteria, moorings and cables, harbor operations equipment. Prerequisite: CE 257 *Harbor and Coastal Engineering I* (3); CE 252 *General Structural Dynamics* (3) or equivalent.

259 **Theory of Ship Motions and Sea Loads** (3)

Hydrodynamics of bodies oscillating in calm water. Cylinders in the free surface. Forces and moments on a fixed body in waves. Linear-strip theory for six degrees of freedom motions for ships and ocean structures in regular waves. Nonlinear-roll motions. Dynamic loads on floating vehicles and fixed structures in a seaway. Prerequisite: CE 268, 271; or equivalent.

260 **Random Processes in Ocean and Coastal Engineering** (3)

(Formerly Statistical Theory for Ship Hull Performance Prediction)

Basic principles and concepts of spectral analysis, related topics necessary for statistical prediction of ocean waves, response of floating and coastal structures. Distribution of envelope of narrow band random processes, long-term prediction, extreme values. Prerequisite: ApSc 115 or equivalent

261 **Analysis of Plates and Shells** (3)

Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations.

theory of folded plate structures. Theory of curved surfaces; general linear bending theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow shell theory. Specific applications. Prerequisite: graduate status.

263 **Theory of Structural Stability** (3)

General criteria for stability; buckling of elastic and inelastic columns and frames; torsional and lateral buckling; variational methods. Buckling of plates and shells under static loads; stability of stiffened structures; effect of imperfections and boundary conditions. Prerequisite: graduate status.

268 **Applied Marine Hydromechanics** (3)

Introductory course; emphasis on experimental methods dealing with the application of hydromechanics to problems relating to the design and performance of ships in the following areas: ship hydrostatics (terminology and concepts), ship resistance (viscous, form, and wave drag), propulsion (screws and other propulsors), dynamics of floating vehicles (maneuvering and control, ship motion in a seaway). Special attention in each area to solving problems related to unusual, as well as conventional, marine vehicles. Prerequisite: approval of Department.

271 **Theoretical Marine Hydromechanics** (3)

Introductory course designed to acquaint the student with some physical concepts and mathematical tools of theoretical marine hydromechanics. Derivation of the fundamental equations and application of potential flow theory to fluid motion around two- and three-dimensional bodies. Introduction to thin-ship and slender-body theories. Derivation of force and moment of bodies moving in calm and disturbed water. Prerequisite: approval of Department.

274 **Mechanics of Water Waves** (3)

Irrotational theory for deep- and shallow-water waves, reflexion, refraction, diffraction, attenuation. Water waves of finite amplitude: shallow-water theory, tides, bores, long-waves theory, conoidal and solitary waves. Wave generation by wind; state-of-the-art based on correlation between theory and measurements. Wave-breaking and reflexion. Prerequisite: ME 221 or equivalent and permission of instructor.

275 **Special Topics in Ocean Engineering** (3)

Selected topics: (1) marine aspects of viscous-flow theory, (2) interfacial (internal) waves, (3) applied random processes in ocean and coastal engineering, or (4) other selected topics. Prerequisite: approval of Department. May be repeated for credit.

PUTER SCIENCE

201 **Introduction to Computer Systems I** (3)

Introduction to programming digital computers in a macro-assembly language and higher-level procedural languages; techniques in machine control and memory addressing. Characteristics of different computer structures and the programming of such machines. Introduction to the structure of compiler languages; parsing of compiler language statements. Characteristics and choice of data processing language. Prerequisite: EE 51 *Applications of Computers* (3) or equivalent; or permission of instructor.

202 **Introduction to Computer Systems II** (3)

Introduction to combinational and sequential logic networks; analysis and synthesis of switching circuits using Boolean algebra; minimization techniques in the design of logical circuits; number systems and arithmetic in digital computers, digital computer architecture and the design of functional sub-units; design of memory, arithmetic, and units comprising a digital computer; information flow, timing, and control in large digital computers. Prerequisite: CSci 201 or permission of instructor.

231 **Finite State Machines** (3)

Analysis and design of sequential networks, state diagrams, flow tables, equivalence of states, races, transition maps, output tables, hazards, synchronous and asynchronous sequential networks. State assignment problem, partitions, partition pairs, information flow inequalities, clocks, state realizations, parallel and serial decompositions, machine networks and decompositions. State identification. Prerequisite: CSci 202 or EE 153.

237 **Computing Systems** (3)

Organization of large digital computer systems. Design of high-speed arithmetic units. Random access and associative memories; rotational storage devices; computer control and interrupt structures. Input-output channels and interfacing problems. Communications in digital computers. Introduction to multiple access and time-sharing systems. Prerequisite: EE 154 *Digital Computer Design* (3).

263 **Digital Computer Programming Systems** (3)

Introduction to the design of computer software and software systems. Design of assemblers and monitor systems. Communication between components of systems. Design of loaders, input-output control systems, and utility systems. Prerequisite: CSci 214 *Data Structures* (3), or EE 158 *Algorithmic Methods and High-level Languages* (3), or permission of instructor.

285 **Approximation of Functions and Data Representations** (3)

Review of linear spaces; least squares, orthogonal functions; nonlinear techniques, gradient search methods; parameter estimation with discrete data; Tchebysheff approximation; approximation and curve fitting by Spline functions and Bernstein polynomials.

ELECTRICAL ENGINEERING

152 **Introduction to Digital Computers** (3)

Introduction to the use of structure of minicomputers and larger computers. Boolean algebra and the design of combinational switching circuits. Number systems, codes, and arithmetic operations in digital computers. Digital computer subsystems and their interconnections. Interfacing equipment to a minicomputer; timing, control, and electronic requirements. Introduction to programming analog computers; analog computer components; analog-to-digital conversion. Prerequisite: EE 157 *Machine and Assembly Language Programming* (3).

153 **Design of Switching Systems** (3)

Switching algebra and Boolean logic; sets, relations, and lattices. Analysis and design of switching devices; design of combinational logic networks. Minimization techniques and decomposition methods. Electronic imple-

mentation of logic; contact networks, symmetric functions, and threshold logic. Reliable design and fault-detection tests. Number systems and codes, geometric interpretation, error detecting and correcting codes; encoders and decoders. Logic and electronic design of functional digital units. Sequential circuits and iterative networks. Minimization and transformation of sequential machines; structure of sequential machines; partitions and covers. State identification and fault-detection experiments. Prerequisite: EE 152 or permission of instructor. May be taken for graduate credit.

201 **Natural Modes and Transients in Electrical Systems** (3)

Transient response and natural modes of electrical systems; techniques for analyzing systems with periodic and aperiodic inputs and outputs; sampling.

202 **Linear System Theory I** (3)

Graph theory and its application to networks and systems; system description in time and frequency domain; linear spaces and linear operators; mathematical representation of linear systems; analytical and computer solutions of the state equations; transient and steady-state response. Prerequisite: graduate status.

203 **Linear System Theory II** (3)

System properties; controlability and observability of linear systems; sensitivity and stability analyses. Irreducible realizations of rational transfer-function matrices; canonical forms, state feedback, and state estimators. Linear composite systems. Prerequisite: EE 202.

204 **Stochastic Signals and Noise** (3)

Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear mean-squared estimation; stationary estimation, stationary random processes, correlation functions, power spectrum; output of linear systems with stochastic inputs; Gaussian processes. Applications drawn for communications, control theory, computer science.

224 **Quantum Electronics of Masers and Lasers** (3)

Basic concepts from quantum mechanics: Einstein coefficients; inversion and pumping mechanisms; rate equations. Resonators, He-Ne laser; organic dye lasers; injection lasers. Nonlinear interactions in lasers. Prerequisite: EE 221 *Physical Electronics I* (3) or equivalent.

235 **Antennas** (3)

General solution of Maxwell's equations in terms of current sources, the far field approximations, radiation from current distributions, field equivalence theorems, the geometrical optics approximation, aperture antennas, receiving antennas, the theory of arrays, and applications to specific antennas and antenna types. Prerequisite: EE 230 *Electromagnetic Theory* (3).

241 **Information Theory** (3)

Measure of information, noiseless coding; communication channels, channel capacity, the noisy channel coding theorem; bounds on the performance of communication system; the Gaussian and binary symmetric channel; feedback communications systems; rate-distortion theory. Prerequisite: EE 204.

242 **Coding Theory** (3)

Error-correcting codes; bounds on the performances of error-correcting codes, group codes; syndrome decoding; cylic codes, their encoding and decoding; Galois fields; BCH codes, burst correction, and threshold-decodeable codes; performance calculations.

243 **Communication Theory I** (3)

Optimum receivers for vector channels and for the additive white Gaussian noise channel; correlation detectors, matched filters; coherent and noncoherent detection and their error probabilities for simplex, orthogonal, and coded systems; bounds on the performance of communications in Gaussian noise; comparison of communications systems. Prerequisite: EE 204 or equivalent.

244 **Communication Theory II** (3)

Schemes for efficient signaling for data sequences; effects of quantizing at the receiver; detection of such signals in colored noise; detection of stochastic signals; the innovations approach in detection and estimation problems; signaling over fading channels and the optimum receivers; diversity techniques and their performances.

245 **Signal Detection and Estimation Theory** (3)

Statistical detection theory, hypothesis testing, sequential detection, estimation theory, maximum likelihood and Bayes methods, estimation of signal parameters and continuous wave forms, Wiener and Kalman filters, applications to the design of optimum receivers, adaptive systems. Prerequisite: EE 241, 244; or equivalent.

*250 **Telecommunication Systems Concepts** (3)
(Formerly TCom 251)

Essential elements of an electrical communication system, speech, TV, and data signals, spectrum, bandwidth, sampling. Amplitude, frequency, and pulse code modulation and comparative performance. Multiplexing schemes, communication quality standards and objectives. Signal power, noise power, distortion, and channel capacity. Probability, traffic theory, reliability, voice, TV and data transmission. Telecommunication, microwave radio, cable, and satellite communications systems.

*251 **Survey of Telecommunication Systems** (3)
(Formerly TCom 250)

Design of a communications link for voice, TV, and data. Loading; the switched telephone network. Transmission system layout and major design considerations. Over-all system design of microwave radio systems. Radiowave propagation fundamentals. Satellite communications, factors affecting the choice of orbit and orbital separation of satellites, satellite transponder. Major design consideration and values of significant parameters for a typical satellite communications link. Over-all design of a cable communication system. Digital transmission and digital terminals. Wideband data transmission. Frequency allocation.

273 **System Optimization** (3)

Parameter optimization problems; theory of minima and maxima; optimization problems for dynamic systems; calculus of variations; the maximum principle and the Hamilton-Jacobi equation; optimization problems with

*EE 250 and 251 cannot be applied toward a Master's or Doctor's degree in the School of Engineering and Applied Science.

constraints; optimal feedback systems; numerical solution of optimal problems. Prerequisite: EE 202 or equivalent.

274 **Nonlinear Systems** (3)

Definition of linear and nonlinear systems; introduction to approximate analysis of nonlinear systems—describing functions, Krylov and Bogoliubov's asymptotical method and Tsypkin's locus. Forced oscillations—jump resonance; stability analysis—Liapunov's criterion, Luré's problem, and Popov's method. Prerequisite: EE 203.

298 **Research** (arr.)

Research as arranged. May be repeated for credit.

299-300 **Thesis Research** (3–3)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

NGINEERING ADMINISTRATION

211–12 **Engineering Administration** (3–3)

Comprehensive and systematic study of the administrative process; industrial, scientific, and engineering environments. Planning: objectives, prediction, policies, plans and characteristics of plans. Organizing: theory of organization, structure, authority, specialization, delegation, staff and committees. Directing: leadership, managing human and material resources. Controlling: setting standards, evaluating performance, using system feedback data for correction and improvement.

241 **Construction Management I** (3)

Contract negotiations; aspects of contracts and specifications important to management. Construction estimating and cost allocation in heavy and building construction; budgeting and accounting concepts.

269 **Elements of Decision-making and Problem-solving** (3)

History and orientation of quantitative methods; concept of quantitative decision-making; decision criteria under certainty, risk, and uncertainty; game theory; utility; the time factor; replacement models. Prerequisite: EAd 170 *Basic Quantitative Methods for Engineering Administration* (3) or equivalent.

GINEERING SCIENCE

203–4 **Probability and Statistics of Metrology** (3–3)

Probability distributions, discrete and continuous distributions; sampling; combinatorial analysis; stochastic processes; conditional probability; correlation; analysis of variance; design and analysis of experiments; Latin Square experiments; factorial experiments; block and lattice design. Prerequisite: ApSc 115 or equivalent.

221 **Theory of Elasticity I** (3)

Infinitesimal strain and compatibility; stress, constitutive relations for isotropic solids, displacement and stress formulation of boundary-value problems, energy principles, the reciprocal theorem, elements of pure tor-

sion and flexure of rods; plane problems in elastostatics and dynamics illustrating stress function and Fourier transform methods. Prerequisite: approval of Department.

231 **Solid State for Engineers** (3)

Crystal structure and binding, elastic constants, lattice vibrations, thermal properties, free electron theory of metals, band theory of solids, semiconductors, rectifiers and transistors, superconductivity. Prerequisite: approval of Department.

232 **Advanced Materials Science** (3)

Simple crystal structures; the defect crystal structure—point defects, line defects, surface defects; grain-boundaries; X-ray and electron diffraction; diffusion in solids, metallic solutions, and compounds; ceramics; polymeric materials; elastic properties; internal friction; geometry, statics, and dynamics of dislocations; microplasticity, plasticity, work-hardening, and fatigue, creep; strengthening mechanisms; radiation damage; cohesive strength. Prerequisite: approval of Department.

234 **Composite Materials** (3)

Principles of composites and composite reinforcement; micromechanics and failure; interface reactions in various composites; reinforcing materials; structure of composites—fiber-reinforced polymers, filler-reinforced polymers, fiber-reinforced metals, directionally solidified alloys, dispersion-strengthened metals. Prerequisite: approval of Department.

237 **Quantum Mechanical Treatment of Metals** (3)

Elements of quantum mechanics, including Schroedinger equation and elementary perturbation theory. Applications to basic processes in the theory of solids: lattice waves, electron states, electron-electron and electron-phonon interactions. Boltzmann equation and transport properties. Fermi surfaces; theory of superconductivity. Prerequisite: EngS 231 or approval of Department.

239 **Physical Ceramics** (3)

Crystal chemistry and the systematic study of the structure of ceramic materials; solid reactions occurring at elevated temperatures; sintering vitrification, diffusional mechanisms and effects; reaction rate theory; elastic, anelastic, and plastic properties of ionic and covalent solids; viscoelastic behavior of vitreous and vitreous-solid systems; phase equilibria of ceramic systems. Prerequisite: approval of Department.

240 **Fracture Mechanics** (3)

Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture, linear elastic systems, plasticity considerations, fracture toughness, engineering analysis, notch strength analysis with limit approach, crack propagation laws, fatigue, fracture testing, comparison of recent continuum theories. Prerequisite: approval of Department.

263 **Atmospheric Physics for Engineers I** (3)

Introduction to physical processes in the earth's atmosphere; comparisons to the atmospheres of other planets. Topics: evolution, structure, dynamics, visible phenomena, the ionosphere, and radiation processes. Prerequisite: approval of Department.

270 **Introduction to Acoustics** (3)

Waves in an infinite homogeneous medium; sound transmission in layer media and through structure, source, and dipole fields; sound propagation in ducts and enclosures; sound propagation through atmosphere and acoustic absorptions, acoustic circuit elements; acoustic transducers; introduction to acoustic measurements. Prerequisite: approval of Department.

271 **Random Process Theory I** (3)

Random processes. Stationarity and ergodicity; mean-square calculus; auto- and cross-correlations and spectra; random processes in linear systems; mean-square estimation, prediction and filtering; zero and level crossings and peak distributions; applications in aerospace sciences. Prerequisite: EngS 203 or approval of Department.

272 **Random Process Theory II** (3)

Discrete and continuous state Markov-processes; chains, queues, diffusion, and passage problems; linear and nonlinear estimation and stochastic control; estimation of correlations and power spectra; applications in communication theory; scattering from random surfaces; stochastic linearization and stability. Prerequisite: EngS 271.

273 **Time Series Analysis** (3)

Harmonic analysis of deterministic and random signals; auto- and cross-correlations and spectra; periodogram, Blackman-Tukey and direct filtering methods of spectral estimation; effects of finite length and digitization; variability; coherence. Fast Fourier transform techniques; applications in modern technology. Prerequisite: EngS 271 or approval of Department.

274 **Noise and Vibration Control** (3)

Introduction to the physical effects of noise and vibration on man, practical sources of noise and their control; building noise, ventilation system noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. Prerequisite: EngS 270, ME 215.

275 **Advanced Theoretical Acoustics** (3)

Acoustic wave motion, several methods of solving inhomogeneous wave equation, theory of sources, scattering and diffraction, duct propagation, introduction to acoustically coupled systems, acoustics in moving media. Prerequisite: ApSc 213, EngS 270.

276 **Acoustical and Mechanical Measurements** (3)

Characteristics of signals, basic transducer elements, standards of measurements and calibrations, signal recording and processing, acoustical and vibration instrumentation, vibration exciters, vibration testing techniques, flow mechanical measurements. Prerequisite: EngS 270, ME 215.

277 **Physical Acoustics** (3)

Concepts of continuum mechanics and thermodynamics, wave propagation in real media, thermal viscous and relaxational attenuations, piezoelectric crystals and ultrasonics, wave propagation in rigid and deformable porous media. Prerequisite: EngS 275.

Psychological and Physiological Acoustics (3)

Auditory system and its response to sound, experimental methodology in

psychoacoustics, subjective response to sound, environmental noise and its evaluation, criteria for the prediction of noise nuisance, nonauditory system response to noise. Prerequisite: approval of Department.

279 **Human Factors in Engineering** (3)

Man-machine interface, effects of physical stresses on human behavior and performance, life support system, learning and conditioning of physical stresses.

280 **Special Topics in Acoustics** (3)

Current methods and problems in acoustics. Topics chosen from such areas as aerospace noise generation and control; instruments and procedures for acoustics measurements; and responses of structures, people, and communities to noise. Prerequisite: approval of Department.

284 **Numerical Methods in Engineering** (3)

Review of programming fundamentals; matrix operations and solution of simultaneous equations; difference methods and computer solution of ordinary and partial differential equations; numerical solution of initial and boundary-value problems in heat transfer, fluid flow, and structural mechanics. Prerequisite: ApSc 213 or equivalent.

285 **Finite Element Methods in Engineering Mechanics** (3)

Derivation of fundamental equations based on energy formulation; stiffness properties of basic finite elements; solution of problems in plane stress and strain, plane- and space-framed structures; plate and shell structures; elastoplastic and dynamic analysis. Prerequisite: CE 210 *Methods of Structural Analysis* (3), or EngS 222 *Theory of Elasticity II* (3); or equivalent.

286 **Analysis and Design of Thin-walled Structures** (3)

Statistics of thin-walled beams and panels, force interplay between stiffeners and skin in the analysis and design of stiffened thin-walled structures; strength and stiffness of locally buckled stiffened structures; classification of loads and safety factors; different considerations governing the design of thin-walled structures; critical evaluation of various structural design procedures. Prerequisite: CE 261, 263; EngS 285.

287 **Automated Design of Complex Structures** (3)

Review of techniques for automated design including mathematical programming, fully stressed design, and optimality criteria; application of automated design techniques to stiffened and composite shell-type structures; multiple-load conditions and design constraints. Prerequisite: approval of Department.

289 **Special Topics in Theoretical and Applied Mechanics** (3)

(Formerly Special Topics in Structural Design)

Selected topics in theoretical and applied mechanics: (1) advanced analytical mechanics, (2) nonlinear mechanics, (3) nonlinear mechanics of continua, (4) wave propagation in solids, or (5) other appropriate topics. Prerequisite: approval of Department. May be repeated for credit.

298 **Research** (arr.)

Basic research projects as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

310 **Aeroacoustics** (3)

General theory of aerodynamic sound generation and propagation, Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise, boundary-layer noise, fan and compressor noise, helicopter noise, sonic booms. Current problems in aeroacoustics. Prerequisite: EngS 275.

311 **Nonlinear Acoustics** (3)

Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing walls. Prerequisite: approval of Department.

312 **Theory of Random Vibration** (3)

Response of linear systems to stationary random inputs. Failures resulting from dynamic response. Response of space vehicle structures to intense noise fields, measurement, and application. Prerequisite: EngS 271, ME 215.

313 **Structural Acoustic Interaction** (3)

Coupled response of structures to sound, system of infinite extent, system of finite extent, sound radiation from structure, sound transmission through structure. Panel response to turbulent boundary-layer excitation. Sound radiation from mechanically excited structure vibration. Prerequisite: EngS 270, 312.

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

CHANICAL ENGINEERING

215 **Theory of Vibrations** (3)

Damped and undamped natural vibrations, transient response and response to harmonic and periodic excitation, natural vibration of discrete and continuous systems; integral formulation of eigenvalue problems, response by modal analysis, approximate methods, influence of secondary effects and constraints, damped systems. Prerequisite: approval of Department.

216 **Structural Dynamics** (3)

Methods of solving vibration problems: differential equation, Rayleigh-Ritz finite element. Free and forced vibration of structural components: straight, curved, and thin-walled beams; plates and shells; sandwich construction. Vibration of built-up structures. Structural wave motion, wave motion in periodic structures. Prerequisite: ME 215.

221 **Intermediate Fluid Mechanics** (3)

The continuum, kinematics of fluids; stress tensor, strain and rate-of-strain tensor; fundamental equations of the flow of viscous compressible fluids; Laplace's equations; source, sink, and doublet; vortices, Biot-Savart theorem and the flow field of a vortex; spherical and cylindrical harmonics; methods of singularity distributions, complex-variable methods; laminar flow of viscous incompressible fluids; boundary-layer concept. Prerequisite: approval of Department.

222 **Applied Fluid Dynamics** (3)

Subsonic lifting line wing theory, direct and inverse solution of the lifting surface theory; singularity method for wing-body combination; vortex lift theory; effects of camber and twist distribution; transonic airfoils, effect of wing sweep, area ruling concept; supersonic linearized wing theory, similarity rules. Prerequisite: ME 221 or equivalent.

227 **Viscous Flow** (3)

Exact solution of Navier-Stokes equations; the small Reynolds number approximations, laminar boundary-layer theory and the techniques for its solution, stability of laminar flows; Reynolds theory of turbulent stresses, applications to internal and external flows, turbulent boundary-layer theory; applications to heat-transfer problems; flow separation. Prerequisite: ApSc 213; ME 221 or equivalent.

235 **Compressible Flow** (3)

Thermodynamics and physical properties of gases, fundamental equations of a compressible inviscid fluid, small perturbation theory, expansions in Mach number and thickness parameters, second-order shock shapes, role of entropy in supersonic flow, shock wave interactions, hodograph transformation, Kármán-Tsien and other model gases, conical flows, transonic flow theory, method of characteristics, rotational nonisentropic flows. Prerequisite: ApSc 213; ME 221 or equivalent.

237 **Propulsion I** (3)

Basic concepts of propulsion: energy transformations in propulsive flows, gas dynamics of combustion, detonation processes; nonuniform flows, mixing; intakes, additive drag; mechanics of flow induction; drag and thrust generation; multiple-flow thrust generators; thrust recovery and augmentation; the propulsion spectrum. Illustrative examples will include propellers, turbojets, turbofans, ramjets, and rockets. Prerequisite: approval of Department.

238 **Propulsion II** (3)

Advanced propulsion concepts: nonsteady flows with viscosity, heat exchanges, and entropy gradients; discontinuities and interaction in nonsteady flow; gas dynamics of nonsteady combustion; static, dynamic, and cryptosteady pressure exchange; energy equalizers and dividers; nonsteady flow thrust generators. Topics for discussion will include a variety of new flow induction and propulsion concepts. Prerequisite: ME 237.

248 **Seminar: Aircraft Design** (3)

Problem of designing an aircraft to certain specifications. Regulatory restraints and requirements, state-of-the-art limitations, computer-aided design, integration of aircraft components, economic considerations, and iterations to final configuration to obtain specified mission profile. Prerequisite: approval of Department.

270 **Aerodynamics of Flight Vehicles** (3)

Aerodynamic loads on flight vehicles, interference effects, application of aerodynamic theory to aircraft design, studies of aircraft dynamics and performance. Prerequisite: ME 222 or equivalent.

271 **V/STOL Flight Dynamics** (3)

(Formerly Flight Dynamics of V/STOL Aircraft)

Various configurations of V/STOL aircraft; airscrew theory, performance,

of V/STOL aircraft. Static and dynamic longitudinal and lateral stability, influence of aerodynamic parameters on flight characteristics, transfer functions of V/STOL aircraft, effect of feedback on stability. Prerequisite: ME 222, 275.

273 **Principles of Automatic Flight Control** (3)

Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of Department.

274 **Principles of Flight Guidance** (3)

Guidance requirements for atmospheric flight; implementation of guidance systems using inertial and radio techniques in conjunction with automatic data processing. Prerequisite: ME 273.

275 **Stability and Control of Vehicles** (3)

Derivation of equations of motion, Euler transformations and direction cosines, stability derivatives and linearization of equations of motion, stability of linear systems with application to longitudinal and lateral dynamics, Laplace transform techniques and frequency response analysis. Prerequisite: approval of Department.

276 **Mechanics of Space Flight** (3)

First- and second-order Hamilton-Jacobi perturbation theory applied to artificial satellites, von Zeipel's methods, special and general perturbation theories for third-body perturbations. Differential correction of orbits by weighted least squares and minimum variance techniques. Comparison of various filtering techniques as applied to orbit determination and other space flight parameter estimation. Prerequisite: approval of Department.

279 **Special Topics in Flight Sciences** (3)

Current problems and methods in high angle of attack stability and control. Nonlinear aerodynamics in the angle of attack region above the stall. Influence of aircraft design and nonlinear aerodynamic parameters on the post-stall stability and control of aircraft. Employment of current experimental techniques and development of equations pertaining to developed spin and recovery characteristics. Prerequisite: ME 275 or approval of Department.

280 **Advanced Thermodynamics** (3)

Statistical significance of the entropy concept, conditions of equilibrium, equilibrium of heterogeneous systems. Application of thermodynamic formalism to magnetic, electric, and solid systems; equilibrium of ionized gases; the Nernst postulate and the third law of thermodynamics. Prerequisite: graduate status.

281 **Nonequilibrium Thermodynamics** (3)

Limitations of equilibrium thermodynamics, entropy production, phenomenological equations and linear laws; postulates of nonequilibrium thermodynamics, formulation of the equations of nonequilibrium systems, statistical foundations, stationary nonequilibrium states; selected applications. Prerequisite: ME 280.

290 **Kinetic Theory of Gases** (3)

Equation of state and physical properties for gas composed of discrete

particles; relation of kinetic theory to thermodynamics; Maxwell distribution of molecular velocities; Boltzmann H theorem. Molecular interactions, free paths, collision rates, scattering coefficients. Introduction to diffusion, viscosity, heat conduction; imperfect gases; flow of gases at low density. Prerequisite: ME 280.

297 **Special Topics in Fluid Mechanics** (3)
Prerequisite: approval of Department.

298 **Research** (arr.)
Research as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit.

English

Chairman: G.E. McCandlish, Professor of English; Stuart 407, Telephone 676-6180

Before students are registered in Engl 10, they are tested in the minimum essentials of vocabulary, spelling, grammar, standard usage, and writing skill. Those students who show marked superiority may, upon passing further tests, be exempted from one or both halves of the English Composition course; those who are inadequately prepared for Engl 10 will be given permission to register for Engl 9 on campus. Engl 9 or 10 is prerequisite to all other courses in English.

ENGLISH COMPOSITION

9 **English Composition: Language as Communication** (3)
(Campus Course)
(Formerly Engl 1x)
Intensive course in English grammar and composition for students inadequately prepared for Engl 10. Begins with detailed instruction, drill, and exercises in basic structure of the English language and in writing paragraphs; continues with content of Engl 10. Engl 9 meets five hours a week and carries 3 semester hours of credit. Total fee, $295 (tuition of $270 plus additional fee of $25).

10 **English Composition: Language as Communication** (3)
(Formerly Engl 1)
Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure.

11 **English Composition: Language and the Arts and Sciences** (3)
(Formerly Engl 2)
Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected books on the nature of language and of the arts and sciences. Prerequisite: Engl 9 or 10.

20 **The Writing of Reports** (3)
(Formerly Engl 11)
Theory and practice in the writing of technical reports. Prerequisite: Engl 9 or 10 and 11.

HUMANITIES

43–44 **Classical Humanities** (3–3)
Interdisciplinary study of the origins of Western thought. Reading and intensive class discussions of selections from the Bible and of five works each semester from the following authors: Homer, Hesiod, Aristophanes, Plato, Aristotle, Aeschylus, Euripides, Sophocles, Herodotus, Thucydides, Lucretius, Marcus Aurelius, Epictetus, Polybius, St. Augustine. Background lectures on the major intellectual, artistic, economic, and social movements.

45–46 **Humanities in the Modern World** (3–3)
Interdisciplinary study of modern Western thought from the Renaissance to the 20th century. Reading and intensive class discussion of five works each semester from the following authors: Machiavelli, Pope, Voltaire, Rousseau, Goethe, Tolstoy, J.S. Mill, Zola, Nietzsche, Kierkegaard, Freud, Kafka, Koestler, T.S. Eliot. Background lectures on the major intellectual, artistic, economic, and social movements.

NGLISH LITERATURE

51–52 **Introduction to English Literature** (3–3)
Representative works by major authors studied in their historical context: discussion of recurrent themes, and introduction to various types and forms of imaginative literature.

91–92 **Introduction to European Literature** (3–3)
Consideration of various types.

115 **Introduction to English Linguistics** (3)
Development of the English language in a historical treatment of English grammar.

ERICAN LITERATURE

71–72 **Introduction to American Literature** (3–3)
Historical survey. Engl 71: from the beginnings to the Civil War. Engl 72: from the Civil War to present.

175 **Special Topics in American Literature** (3)

Epidemiology and Environmental Health

Chairman: J.W. Millar, Vivian Gill Professor of Epidemiology and Environmental Health; Ross Hall, Telephone 331-6117

101 **Environmental Sanitary Science I** (2)
Water: general characteristics (urban and rural), treatment and distribution, public bathing place sanitation, design and function of water treatment facilities.

102 **Environmental Sanitary Science II** (2)
Recognition and control of environmental pollution. Treatment and disposal of human wastes—excreta, refuse, and air.

103 **Environmental Sanitary Science III** (2)
Dairy products and food sanitation; processing, storage, and distribution of food. Supervision and training of personnel involved with food and the food industry.

104 **Environmental Sanitary Science IV** (2)
Housing, urban and institutional; heating, ventilation, lighting, and noise. Study of federal and municipal regulatory aspects.

105 **Air Pollution Abatement** (2)
Association of air pollution and disease and the effects of major pollutants on man. Air measurement and air measurement techniques demonstrated.

106 **Environmental Science of Nosocomial Infection** (1)
Developing a surveillance protocol for nosocomial infection. Microbiological assay of the animate and inanimate components of the hospital environment.

121 **Environmental Biostatistics** (2)
Statistical reasoning, collection of data, rates, incidence, and prevalence. Generalization of observations and use of measurement data.

122 **Environmental Epidemiology I** (2)
Infectious diseases: bacterial, viral, rickettsial, protozoal, and helminthic.

123 **Environmental Epidemiology II** (2)
Zoonoses, deficiency diseases, chronic disease, pneumoconiosis, mental health, maternal and child health.

131 **Environmental Epidemiology III** (1)
Venereal disease: etiology, clinical manifestations, diagnosis; prevention and control of syphilis, gonorrhea, chancroid, granuloma inquinale, and LGV.

141 **Public Health Entomology I** (2)
How the arthropods affect man. Study of host-parasite vector relationships; principles of systematic biology and basic insect taxonomy and toxicology.

2 Public Health Entomology II (2)

Identification, life cycles, and bionomics of medically important insects and other arthropods.

3 Public Health Entomology III (1)

Study of chemical, biological, and mechanical control of all medically important arthropods.

4 Public Health Entomology IV (1)

Prevention and control of rodent infestation; identification, habits, and relationship to man.

1 Public Health Microbiology I (3)

Medical parasitology, protozoology (intestinal), the Haemosporidia (malaria), the Haemoflagellates and the metazoa (helminths) of medical importance.

2 Public Health Microbiology II (2)

Clinical bacteriology, characteristics and identification of the bacteria involved in disease, study of rickettsia and viruses.

3 Public Health Microbiology III (2)

Study and identification of the flora of water, dairy products, food, and the atmosphere.

4 Public Health Microbiology IV (1)

Mycology: study of medically important fungi, systematic mycoses and dermatomycoses.

Industrial Hygiene I (2)

Chemical hazards: study of diseases from chemical exposure, toxic dusts, metal fumes and vapors, gases, and organic compounds.

Industrial Hygiene II (2)

Physical hazards: biological effects of low and high temperatures, radiation (electromagnetic, ultraviolet, ionizing), illumination, sound, pressure, and atmospheric pollution.

Practicum in Environmental Health (12)

Supervised field experiences in environmental health: food service, housing, water, sewage and solid waste, and infectious diseases; occupational health problems; reports and conferences. Admission by permission of Department Chairman.

Public Health Administration I (1 to 3)

Activities and organization; philosophy, background, and development. Public health activities include vital statistics, laboratory services, education, nursing, and social services.

Public Health Administration II (1 to 3)

Administrative considerations, including governmental aspects, legal considerations, fiscal management, personnel factors, and public relations in public health organizations. Prerequisite: Epid 191.

231 **Veneral Disease in the Community** (3)

A survey course to develop an understanding of venereal disease problems. Etiology, clinical manifestations, diagnosis, prevention, and control. For parents, school teachers, health personnel, and other educators.

254 **Human Ecology** (3)

Ecology—man within the framework of reference—physical and cultural anthropology, geography, sociology, urban planning, public health, and public administration.

293 **Public Health and School Health Methods and Activities** (3)

Relationship between public health and school health. The purpose of the course is to aid the teacher in presenting information in the classroom setting.

Forensic Sciences

Chairman: R.C. Allen, Professor of Law, Building R, 3rd floor, Telephone 676-7319; or Bacon 300, Telephone 676-7390

201 **Serology, Microscopy, Mineralogy** (3)

Principles of forensic serology; microscopic and optical analyses of human and animal reproductive cells, hairs, natural and synthetic fibers, and materials of a mineral nature.

202 **Instrumental Analysis** (3)

Principles and application of various instrumental methods to the examination of criminal evidence, including chromatographic and spectrophometric techniques and mass spectrometry.

203 **Examination of Questioned Documents** (3)

Theory and principles of handwriting and handprinting, duplicating processes, paper manufacture, and fiber analysis; studies of paper and methods of examination of questioned documents.

204 **Firearms and Tool-mark Identification** (3)

Study of methods for identifying firearms, cartridge casings, tool marks, tire marks, and footprints.

*214 **Forensic Psychiatry** (3)

Introduction to the constructs of dynamic psychiatry, psychiatric treatment, and the nomenclature of mental disorders. Consideration of expert testimony, direct examination and cross-examination in hospitalization and criminal cases.

220 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (3)
(Formerly ForS 205 Survey of Forensic Science (3) and ForS 226 The Crime Lab, the Forensic Scientist, and the Criminal Lawyer (3))

Survey of the forensic physical sciences; qualifications and preparation of the expert witness, and his role in court in criminal and civil cases; operation and functioning of the crime lab.

* May also be taken through the National Law Center, with permission of the Dean of the National Law Center and of the instructor.

224 **Introduction to Criminal Law, Procedure, Evidence, and Legal Methods** (3)

Principles of criminal law and procedure, preparation and presentation of evidence, examination of witnesses, and the methods of legal research.

225 **Advanced Criminal Evidence** (3)

Study of procedural rules affecting the collection and use of physical evidence, with emphasis on court opinions defining the rules of search and seizure and admissibility of evidence. Prerequisite: ForS 224 or equivalent experience.

*227 **Advanced Criminal Procedure** (3)

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Prerequisite: ForS 224 or equivalent experience.

*228 **Administration of Criminal Justice** (3)

Consideration and analysis of selected advanced problems in the administration of criminal justice. Emphasis on the role and professional responsibilities of prosecutor and defense counsel and on development trends in the law. Prerequisite: ForS 224 or equivalent experience.

*229 **The Police and the Community** (3)

Problems and potential of contemporary urban law enforcement: the role and perspective of the police officer.

*231 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3)

Role which knowledge of crime causation may play in assessing devices to control deviant behavior: factors related to criminal behavior; current causal theories.

*232 **Law and Criminology II: Society's Responses to the Criminal Offender** (3)

Study of punitive, mechanical, and correctional approaches to offenders. Emphasis on changing responses to criminal and delinquent behavior, and research on effectiveness.

241 **Food and Drug Law** (3)

The Federal Food, Drug, and Cosmetic Act, and related laws. Consumer, government, and industry viewpoints.

254 **Seminar: Selected Topics in the Forensic Sciences** (3)

(Formerly Seminar: Recent Developments in Forensic Science (2))

Exploration of selected current issues in research, investigation, and law.

260 **Introduction to Human Physiology and Pathology** (3)

Introduction to physiology and pathology of the human body; emphasis on medical terminology. Basic understanding of the body functions in health and disease.

261 **Introduction to Forensic Pathology** (3)

Terminology and scientific techniques used in medicolegal investigations:

*May also be taken through the National Law Center, with permission of the Dean of the National Law Center and of the instructor.

sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

262 **Current Trends in Forensic Pathology and Forensic Odontology** (3)
Emphasis on (1) the relationship among law, medicine, and law enforcement; and (2) the advancement of forensic knowledge.

263 **Seminar: Law, Medicine, and Forensic Sciences** (3)
Emphasis on the introduction of forensic science data/evidence in civil and criminal cases.

264 **Medical Jurisprudence** (3)
Legal problems inherent in the practice of medicine. Laws regulating health personnel and health industry. Emphasis on professional liability.

266 **Forensic Neuropathology** (3)
Fundamentals of neuropathology of natural disease and traumatic injuries of the nervous system, including demonstrations of gross pathologic specimens.

267 **Applications of Histochemistry to the Forensic Sciences** (3)
Chemical and physical methods for the localization, identification, and characterization of materials under the microscope, including carbohydrates, enzymes, lipids, minerals, pigments, and proteins.

268 **Photography in the Forensic Sciences** (3)
Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. Laboratory fee, $25.

269 **Principles of Forensic Toxicology** (3)
Analytical procedures used for the detection of drugs, poisons, and toxic agents in biological specimens. Admission by permission of instructor.

295 **Research** (arr.)
Open to qualified Master's degree students. Research on problems approved by the Chairman of the Department or academic adviser, under the supervision of an appropriate staff member.

299–300 **Thesis Research** (3–3)

French*

Chairman: J.F. Burks, Professor of French; Monroe 429. Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year French** (3–3) (Campus Course)
A year course: credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunciation, conversation, grammar.

* Administered by the Department of Romance Languages and Literatures.

composition, reading of modern French prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year French** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Fren 4. Conversation, grammar, composition, reading in modern French prose, introduction to French civilization. Aural training, oral practice in language laboratory. Prerequisite: Fren 1–2, or two years of high school French. Laboratory fee, $17.50 a semester.

Geodesy*

Program Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science; Telephone 946-3557

12 **Plane Surveying** (3)

Theory and practice in measurement of distances, angles, and elevations; traversing, leveling, and triangulation; stadia surveying, plane coordinate computations, and miscellaneous surveying problems. Prerequisite: Math 6 or equivalent.

13 **Geodetic Surveying** (3)

Elements of geodetic and hydrographic surveys; electronic measurements, triangulation, trilateration, and precise traverses; geodetic leveling and precise trigonometric leveling; introduction to geodetic astronomy and to least squares adjustment. Prerequisite: Geod 12 or permission of instructor.

17 **Elementary Photogrammetry** (3)

Fundamentals of aerial photography, photogrammetric optics, and photographic processes; mathematics of vertical and tilted photographs; stereoscopy and parallax; planning and executing the photogrammetric project; radial triangulation methods; photomaps; oblique and terrestrial photography. Prerequisite: Cart 2, Geod 12; or permission of instructor.

18 **Intermediate Photogrammetry** (3)

Basic photogrammetry theory and practice. Stereoscopic plotting instruments; graphical and computational methods for adjusting strips of aerotriangulation; electronic computers. Method of least squares applied to photogrammetry. Prerequisite: Geod 17.

110 **Map Projections** (3)

Mathematics of projections; geometry of sphere and ellipsoid; distortions; conic, cylindrical, and azimuthal projections; geodetic projections. Prerequisite: Math 32.

117 **Advanced Photogrammetry** (3)

Analytic photogrammetry. Prerequisite: Geod 18, Math 33.

*Affiliated with the Department of Geography and Regional Science.

155 **Elementary Geodesy** (3)
Principles and formulas basic to theoretical and applied geodesy, with application to special problems; computations on an ellipsoid, gravimetry, deflection of the vertical and Laplace's equation, introduction to satellite geodesy. Prerequisite: Geod 13, Math 32; or permission of instructor.

156 **Geodetic Astronomy** (3)
Principles and formulas for the astronomic determination of longitude, time, azimuth, and latitude; star catalogues; observing and time-recording instruments; practice in observing and computation. Prerequisite: Geod 13, Math 32; or permission of instructor.

160 **Mathematics of Adjustments and Least Squares** (3)
Types and distribution of errors, Gaussian and Poisson distributions, fundamentals of matrix algebra with special emphasis on least squares adjustment. Prerequisite: Geod 155, Math 33.

161 **Adjustments in Geodesy and Photogrammetry** (3)
Adjustment theory and special adjustment problems. Prerequisite: Geod 160.

Geography and Regional Science

Chairman: Marvin Gordon, Professor of Geography and Regional Science; I-200. Telephone 676-6185

51 **Introduction to Geography** (3)
General survey of the various systematic, physical, and human fields of geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts.

52 **Introduction to Economic Geography** (3)
Examination of the basic principles which determine the location of economic activities on the surface of the earth.

127 **Population and Settlement** (3)
Patterns of world population; factors contributing to population pressures, growth, and migrations.

132 **Resource Management and Conservation** (3)
(Formerly Resources and Environment)
Principles and practices in effective utilization of resources in the United States and selected areas; public policies relating to conservation; environmental systems, perception, and impact studies.

133 **Geography of Poverty and Hunger** (3)
Consideration of the locational aspects and correlates of poverty and hunger; rural and urban poverty regions; regional food budgets and taboos; programs concerned with the elimination of poverty and hunger.

141 **Urban Settlement** (3)
Distribution of urbanization on the surface of the earth; processes which lead to urbanization; theories which can be used to analyze the location of cities.

145 **Cultural Geography** (3)

Analysis of the relationships between culture and environment; emphasis on spatial and ecological considerations.

146 **Political Geography** (3)

Analysis of the interrelationships between the political community and the human and physical environment.

148 **Principles of Geography** (3)

Study of geographic principles, technology and tools designed to meet specific needs of teachers. Emphasis on the practical application of geographic concepts and the use of source materials in the classroom.

155 **Africa** (3)

Survey of the cultural and physical regional patterns of Africa.

161 **Latin America** (3)

Examination of spatial characteristics of physical and cultural phenomena in Middle and South America.

164 **Geography of China** (3)

Survey of the cultural and physical regional patterns of China.

208 **New Perspectives in Geography** (3)

An overview of recent trends in geographic research. Selected topics include diffusion processes, spatial behavior, locational analysis, and environmental perception.

224 **Seminar: Political Geography** (3)

Study of the spatial relationships between the political community and environment.

243 **Seminar: Urban Geography** (3)

Functional processes affecting the evolving morphology and internal spatial patterns of urban phenomena; emphasis on economic factors, behavioral considerations, and impact of time.

Geology

Chairman: Geza Teleki, Professor of Geology; Bell 3, Telephone 676-6190

1–2 **Introductory Geology for Nonscience Majors** (3–3) (Campus Course)

Lecture (2 hours), laboratory (2 hours), optional field trips. Survey covering the principles of geology; emphasis on man's effect on the environment. Laboratory fee, $12 a semester.

3 **Introductory Geology for Nonscience Majors** (3)

Nonlaboratory course for off-campus students only. Survey covering the principles of geology.

4 **Introductory Geology for Nonscience Majors** (3)

Geological periods, evolution of life on earth. Nonlaboratory course for off-campus students only. *Prerequisite:* Geol 1 or 3, or permission of instructor.

125 **Marine Geology** (3) (Campus Course)

Lecture and map work. Principles of oceanography and submarine geology; topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: Geol 1–2 or 21–22; or permission of instructor

141 **Introductory Geochemistry** (3) (Campus Course)

Lecture (2 hours), laboratory as arranged. Principles and theories on the abundance, relationships, and distribution of the elements in various rock and mineral species. Prerequisite or concurrent registration: Geol 11* or equivalent; Chem 11–12; Math 30; Phys 1 or 3; or permission of instructor. Laboratory fee, $12.

Geophysics*

Program Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic Science; Telephone 946-3557

105 **Elementary Geophysics** (3)

Introduction to geophysics; origin of the earth, geochronology, seismology, gravity, and geomagnetism. Prerequisite: Geol 1 or 3, Math 32; or permission of instructor.

106 **Interpretation Theory—Geophysics** (3)

Development of mathematical and physical foundations for interpreting seismic, gravimetric, and magnetic data. Prerequisite: Geop 105.

115 **Elementary Seismology** (3)

Principles of seismographs; analysis of stress and strain, interpretation of earthquake seismograms, location of earthquakes; seismic waves in the earth and the structure of the earth's interior as deduced from geophysical data, earthquake magnitude energy and intensity, seismic risk and the effects of earthquakes, review of earthquake activity throughout the world. Prerequisite: Geop 105.

Germanic Languages and Literatures

Chairman: Carl Steiner, Associate Professor of German; Rice 404, Telephone 676-6195

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year German** (3–3) (Campus Course)

Fundamental concepts of German culture; essentials of German structure and basic vocabulary; reading of easy prose and conversation. Aural-oral practice in language laboratory. Prerequisite to Germ 2: Germ 1 Laboratory fee, $17.50 a semester.

* Affiliated with the Department of Geography and Regional Science.

3–4 **Second-year German** (3–3) (Campus Course)

Introduction to German civilization, selections from modern German prose, continuation and review of German structure, conversation, and simple composition. Aural-oral practice in language laboratory. Prerequisite to Germ 3: Germ 1–2 or equivalent. Prerequisite to Germ 4: Germ 3. Laboratory fee, $17.50 a semester.

Health Care Administration

Chairman: Leon Gintzig, Professor of Hospital Administration; Binney 21, Telephone 676-6220

154 **Introduction to Hospital Management and Procedures** (3)
(Formerly Survey of Health Care Organization and Procedures)

Introduction to the structure and management of contemporary American hospitals; emphasis on the organization of hospital departments and on the functions of the department manager.

202 **Introduction to Health Care** (3)

Lecture and discussion (2 hours), laboratory (2 hours). Survey of organization, functions, trends, and issues among governmental, nongovernmental, voluntary sectors; survey of major diseases by organ systems and their impact on administration and planning; medical terminology.

203 **Health Care Organization and Management** (3)

Lecture and discussion (2 hours), laboratory (2 hours). History and current character of institutional health care. Organizational functions and structure of various kinds of health care facilities. Prerequisite or concurrent registration: Mgt 201.

205 **Hospital Management Procedures** (3)

Lecture and discussion (2 hours), laboratory (2 hours). Departmental administration. Survey of hospital law; hospital forms, procedures, and systems; and hospital programs pertaining to disaster relief, safety, fire prevention.

Hebrew*

Chairman: J.E. Ziolkowski, Associate Professor of Classics; T-23, Telephone 676-6125

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

21–22 **Beginning Hebrew** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Clas 22. Elementary Hebrew grammar, readings from the Old Testament and contemporary literature, composition and conversation.

*Administered by the Department of Classics.

23–24 **Intermediate Hebrew** (3–3) (Campus Course)
Review of grammar; continued development of reading comprehensi composition, and conversation.

History

Chairman: R.W. Kenny, Professor of History; Stuart 419, Telephone 676-6230

Departmental prerequisite: Hist 39–40 or former 91–92 is prerequisite to cours 108 through 158 and 187 through 196; Hist 71–72, to courses 167 through 1 either Hist 39–40, 71–72, or former 91–92, to courses 161 through 166. Prerequisi to Hist 105–6 is either Hist 39–40, former 91–92, or a background in a scienc Students may waive one or more of the prerequisite courses by passing a depa mental waiver examination, by attaining scores of 600 or above on the College E trance Examination Board Achievement tests, or by good performance on Advance Placement Examinations.

39–40 **European Civilization in Its World Context** (3–3)
Hist 39: political, social, economic, and cultural history to early moder era. Hist 40: from early modern era to present.

71–72 **Introduction to American History** (3–3)
Hist 71: political, social, economic, and cultural forces of the Unite States in their world setting from 1492 to 1861. Hist 72: from 1861 t present.

131 **History of Germany** (3)
Political, social, and cultural development from Reformation to unifica tion.

138 **History of World Communism** (3)
The international communist movement from its beginnings to the present.

145 **History of Russia: 18th and 19th Centuries** (3)
From the reign of Peter the Great to the Russian Revolution.

146 **History of Russia: Soviet Russia** (3)
Revolution and Soviet rule to the present.

149–50 **European Diplomatic History** (3–3)
Emphasis on policies and actions of the great powers and their statesmen. Hist 149: 1812 to 1890. Hist 150: since 1890. Students who receive credi for Hist 150 cannot receive credit for Hist 157 *20th-century European Diplomatic History*.

163–64 **History of Latin America** (3–3)
Political, socioeconomic, and cultural development. Hist 163: colonial period. Hist 164: national period.

181–82 **U.S. Diplomatic History** (3–3)
Survey of American foreign relations from the era of the American Revo lution. Hist 181: to 1898. Hist 182: 20th century.

183 **Oversea Expansion of the United States** (3)
Political, economic, social, and cultural life of our outlying possessions.

195–96 **History of East Asia** (3–3)
Civilizations of China and Japan; emphasis on institutional development. Hist 195: beginnings to about 1800. Hist 196: from eve of the modern era to present.

201 **History and Historians** (3)

Students who receive credit for Hist 201 cannot receive credit for Hist 199 *Proseminar: Readings for the History Major.*

Italian*

Chairman: J.F. Burks, Professor of French; Monroe 429, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Italian** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Ital 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Italian prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year Italian** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Ital 4. Conversation, grammar, composition, reading of modern Italian prose, introduction to Italian civilization. Aural training, oral practice in language laboratory. Prerequisite: Ital 1–2 or two years of high school Italian. Laboratory fee, $17.50 a semester.

Journalism

Chairman: Philip Robbins, Associate Professor of Journalism; Stuart 300A, Telephone 676–6225

116 **Magazine Layout and Design** (3)

Layout, typography, and design for magazines, newsletters, house organs, and similar publications for associations, institutions, and industry.

145 **Principles and Problems of Public Relations** (3)

Principles, problems, and ethics of public relations for government agencies, commercial establishments, educational and other public institutions. Case histories of successful programs.

Latin American Civilization—Special Program

Program Director: R.C. Burns; Building LL, Telephone 676-7049
Faculty Consultants: Marvin Gordon, Professor of Geography and Regional Science; O. Humphrey, Jr., Associate Professor of Anthropology; P.F. Klarén, Assistant

*Administered by the Department of Romance Languages and Literatures.

Professor of History; J.W. Robb, Professor of Romance Languages; B.M. Sapin Professor of International Affairs and Political Science; K.L. Storrs, Adjunct Assistant Professor of Political Science.

101 **Latin American Civilization** (3)

A three-week, University-conducted study program in a selected area in Latin America, effecting a broad synthesis of history, politics, economy, geography, language, and literature in order to achieve an understanding of contemporary problems and assess national attitudes in the light of world relations. On-the-spot seminars, guest lectures at universities, instructional visits to government offices, first-hand observation of each country and the operation of its economy, comparisons and contrasts among the countries of the area. May be repeated for credit.

Management Science

Chairman: E.K. Winslow, Associate Professor of Behavioral Sciences; Government 201, Telephone 676-7375

118 **Introduction to Information Processing** (3)

Basic principles, terminology, and methods of computer data processing. Introduction to the use of the computer as a tool through homework assignments illustrating typical problems encountered in business and government data processing. Assignments involve flow charting and computer programming in a higher level language (FORTRAN) and are run on the University's computer and on the School's computer terminals. Laboratory fee, $25 (applicable to off-campus locations having access to the University Computer Center).

119 **Computer Programming for Information Systems** (3)

COBOL programming for business and government data processing applications. For students already familiar with basic computer concepts, flowcharting, and programming. Emphasis on practical computer applications in accounting and management information systems. Prerequisite: Mgt 118 or Stat 97. Laboratory fee, $25 (applicable to off-campus locations having access to the University Computer Center).

120 **Information Systems Development I** (3)

Assessment of the systems concept and its relationship to organizational information decision-making and management. Concepts and techniques involved in the initial development of new or revised computer-based information systems, e.g., systems analysis and design phases. Prerequisite: Mgt 118, 119; or permission of instructor.

121 **Information Systems Development II** (3)

A further examination of the information systems development process, including concepts and techniques for assessment, selection, introduction, operation, and maintenance of a newly designed automated information system. Prerequisite: Mgt 120 or permission of instructor.

201 **Advanced Administrative Management** (3)

Principles and practices common to administrative units of all kinds.

203 **Mathematics for Management** (3)

Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus, and linear algebra to optimization problems. Prerequisite: algebra.

204 **Quantitative Factors in Administration** (3)

Survey of quantitative techniques used in the solution of management problems. Potentials and limitations of mathematical models and proper areas for their application. Topics include probability, statistical decision theory, linear programming, waiting line, inventory replacement models.

207 **Human Behavior in Organizations** (3)

Individual, group, intergroup, and other human behavior and development; application of social science research to administration. Learning exercises and practical applications emphasized.

208 **Current Issues in Organizational Behavior** (3) (Campus Course)

Study of behavioral factors relating to issues such as automation, ethics, interpersonal relations, organizational change, and similar problems. Problems in behavioral science research. Prerequisite: Mgt 207.

210 **Behavioral Factors in the Process of Change** (3) (Campus Course)

Review of research, theory, and practice related to the process of change. Basic principles of planned change; individual, group, organization, community and cultural change. Emphasis on the relationship between human behavior research and theory and the change process. Prerequisite: Mgt 207 or permission of instructor.

212 **Organizational Development: Concepts and Methods** (3) (Campus Course)

Primarily for doctoral students. Examination of different concepts of organizational structure, processes, and growth. Models of organizational change will be developed with a taxonomy of methods of initiating action to further organizational development. The methods of action, research, team building, confrontation methods, objectives analysis, survey research, and structural revision will be related to organizational development processes. Prerequisite: Mgt 210 or equivalent.

213 **Consultative Processes in Organizations** (3) (Campus Course)

Primarily for doctoral students. Examination through actual practice as well as theory of the nature of the helping process between one person or group and another person or group. Dynamics of the consulting process will be explored as well as role differences in internal and external consultation. Development of skill in the helping relationship will be furthered within the framework of interpersonal relation concepts and laboratory experiences. Prerequisite: Mgt 210 or equivalent.

224 **Theory and Management of Systems** (3)

Introduction to systems theory and qualitative systems analysis. Analysis of systems in organizations and their impact on management: systems point of view, enterprise as a system, effect of technical and management systems on organization structure, information-decision systems, systems design, and dynamic aspects of organizational systems. Prerequisite: Mgt 201, 204 or 225 (off campus), 207.

225 **Managerial Statistics I** (3)

The mathematics of probability and statistics and its applications in ma agement science and operations research. Topics include random va ables; discrete and continuous probability distributions; moments a other descriptive measures; sampling theory; and an introduction to stat tical estimation, hypothesis testing, and regression analysis. Prerequisit Mgt 203 or equivalent.

226 **Managerial Statistics II** (3)

Management applications of the theory and techniques of mathemati statistics. Topics include maximum likelihood and other methods of est mation, hypothesis testing, descriptive measures of bivariate distribution regression and correlation, analysis of time series, econometric models an multiple regression, statistical decision theory, and the revision of prob bilities in decision-making. Prerequisite: Mgt 225.

227 **Mathematical Programming: Techniques and Applications** (3)

Technical and management considerations of linear and nonlinear pro gramming. Mathematical and computational aspects of linear program ming. Formulation of linear programming models. Studies of applica tions of linear programming. Introduction to theory and application o nonlinear programming. Prerequisite: Mgt 203 or equivalent.

228 **Techniques of Operations Research** (3)

Survey and introduction to contemporary operations research techniques Analytical methods such as simulation, queuing, inventory models, dy namic programming, integer programming, and network flows. Prerequ site: Mgt 225, 227.

229 **Seminar: Management Science and Operations Research** (3)

Supervised study in depth and advanced projects in management science and operations research. Prerequisite: Mgt 226, 227; or permission of instructor.

230 **Administration of Research and Development** (3)

Examination of technological, political, and economic factors affecting the R&D environment; operational aspects; management problems in military governmental, and industrial organizations; project selection, resource allo cation, personnel, planning and control, measurement and evaluation.

239 **Seminar: Administration of Research and Development** (3)
(Formerly Mgt 231)

Individual and/or group in-depth research projects dealing with various phases of research and development management. Topic will vary each time the course is offered according to the emerging technology, current operational problems, and student interest. Prerequisite: 6 to 9 semester hours of research and development management or permission of in structor.

240 **Survey of Information Technology** (3)

A management-oriented presentation of the vocabulary, concepts, and trends in computer hardware and software, information systems design and development, organizational impact, and effective management: mile stones of past and current research; computer technology as a rapidly evolving force of major significance in business, government, and industry

Designed for students without prior information technology experience and who do not plan to take additional information technology courses. Laboratory fee, $25 (applicable to off-campus locations having access to the University Computer Center).

241 **Management Information Systems Development and Application** (3)

Contemporary theories and practices in the development of management information systems. Participation in the design of information systems specifications. The roles of both management and systems design personnel in the systems development process studied and evaluated. Impact of management information systems upon the organization and its decision-making processes evaluated. Case studies. Prerequisite: an introductory course in information technology, or permission of instructor.

242 **Comparative Computer Systems** (3)

Characteristics and capacities of the range of information processing equipment in use today. Recent and prospective equipment and software development. Selection of computers and related software and equipment. Prerequisite: Mgt 241 or permission of instructor.

243 **Management of Information Technology** (3)

Advanced course: emphasis on principles, practices, and trends in the management of information technology. Topics include the role and control of an information processing installation; trends, new hardware, and advanced technology in the computing milieu and their implications for information processing management; and analysis of the performance of the data processing activity internally and externally, according to developed criteria. Case studies. Prerequisite: Mgt 241, 242; or permission of instructor.

244 **Information Systems and Telecommunication** (3)

Study of the growing linkages among the technology of information processing, information transmission, and organization management—computers, communications, and managers—from two points of view: (1) potentials for improved management, and (2) solving communications-related problems of informations systems design, implementation, and operation. Admission by permission of instructor.

245 **Data Base Management** (3)

An in-depth approach to the understanding and use of the latest techniques for developing and implementing an effective data base system. Topics include data base organization, creation, and maintenance; effort and economic justification; evaluation criteria; standardization of data base systems; impact of packaged data management systems; and an analysis of the current state-of-the-art in data base development. Prerequisite: Mgt 119, 241. Laboratory fee, $25, (applicable to off-campus locations having access to the University Computer Center).

249 **Seminar: Information Technology** (3)

Current problems in the design and implementation of computer-supported systems; emphasis on current state-of-the-art through discussion with leading experts in the field, analysis of literature. Prerequisite: Mgt 241, 242, 243; or permission of instructor.

262 **Seminar: Contemporary Administrative Theory** (3) (Campus Course)

Primarily for doctoral students. Current and prospective theory and practice from an inter- and trans-disciplinary viewpoint. Topics include gen-

eral systems theory, game theory, axiology and management values, anti-
thetics, value engineering, cybernetic systems, decision theory, innovation
and creativity models, and general semantics. Prerequisite: Mgt 201, 204,
207, 224.

*280–81

–82 **Managerial Aspects of National Security** (3 or 4–3 or 4–3)

The application of business management principles to the military aspects
of national security; organization and administration of the federal govern-
ment for national defense; management of national resources (natural, hu-
man, energy, economic); budgeting and controllership; determination of
requirements; procurement; production; supply management; and commu-
nications.

295 **Research Methods** (3)

Research techniques, sources of information, array and analysis of data,
interpretation and presentation of the findings.

Mathematics

Chairman: T.P.G. Liverman, Professor of Mathematics; Library 719J, Telephone
676-6235

No Mathematics courses numbered 1 to 100 are available for college credit if the
student's previous training in mathematics meets the prerequisite for a higher num-
bered course.

Graduate credit may not be given for Mathematics courses numbered from 10
to 200 without the permission of the Chairman of the Department.

3 **College Algebra** (3)

Equivalent to the standard two years of high school algebra with several
additional topics. Prerequisite: one year each of high school algebra and
high school geometry.

6 **Plane Trigonometry** (3)

Prerequisite: two years of high school algebra and one year of high school
geometry, or Math 3 (or concurrent registration therefor).

9 **General Mathematics I** (3)

For students electing Math 9 and 10 as a terminal sequence. Logic, sets,
number systems. Prerequisite: two years of high school mathematics.

10 **General Mathematics II** (3)

Mathematical systems, geometry, and introduction to statistics and prob-
ability. Prerequisite: Math 9.

30 **Precalculus** (3)

Set theory, inequalities, basic analytic geometry, functions and relations.
Polynomial, trigonometric, logarithmic, and exponential functions. Pre-
requisite: Math 3 and 6; or one and one-half years of high school algebra,
one year of high school geometry, and one-half year of high school tri-

* Available only to students in the Master of Science in Administration program at the Industrial
College of the Armed Forces.

onometry; or equivalent. Prior to registration, new students should take a placement examination in algebra and trigonometry.

31 **Calculus of One Variable** (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent. Math 30 may be waived as a prerequisite by examination on scheduled dates.

32 **Calculus of Several Variables** (3)

Vectors, determinants, partial derivatives, multiple integrals, curves. Prerequisite: Math 31.

33 **Calculus of Vector Functions** (3)

Differential equations, infinite series, vector calculus, line integrals, Green and Stokes theorems. Prerequisite: Math 32.

51 **Mathematics for the Social and Management Sciences I** (3)

Notion of function, graph of function, and sequences; differential and integral calculus of functions of one variable; exponential and logarithmic functions. New students should take a placement examination in algebra prior to registration.

52 **Mathematics for the Social and Management Sciences II** (3)

Functions of several variables; partial derivatives, maxima and minima Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51.

111 **Mathematics for Engineers and Physicists I** (3)

Differential equations, linear algebra, Fourier series and integral, differential equations of the first order. Prerequisite: Math 32.

112 **Mathematics for Engineers and Physicists II** (3)

Ordinary differential equations, systems of differential equations, boundary-value problems, partial differential equations. Prerequisite: Math 111.

124 **Introduction to Matrix Theory** (3)

Operations on matrices, linear equations, matrix inversion, vector spaces, characteristic roots and vectors, spectral theorem, quadratic forms. Prerequisite: Math 31.

134 **Introduction to Boundary-value Problems** (3)

Prerequisite: Math 111 or 142.

139 **Advanced Calculus I** (3)

Review and extension of elementary one-variable calculus, emphasis on the theoretical foundations; differential calculus of several variables. Prerequisite: Math 33.

140 **Advanced Calculus II** (3)

Differential and integral calculus of several variables; contraction maps, implicit function and differential equation theorems. Prerequisite: Math 139 or equivalent.

153 **Introduction to Numerical Analysis** (3)

Introduction to fundamentals of numerical analysis using modern digital computers. Solution of linear systems and of ordinary differential equations. Interpolation polynomials. Iterative solution of nonlinear equations. Simple quadrature techniques. Prerequisite: Math 111 or 139, or equivalent.

*160 **Introduction to Abstract Algebra for Teachers** (3)

Basic algebraic structures, such as groups, rings, integral domains, and fields; properties of integers and rational numbers. Prerequisite: Math 31 or equivalent.

*161 **Introduction to Linear Algebra for Teachers** (3)

Linear functions, solution of equations, quadratic forms, change of basis. Prerequisite: Math 31 or equivalent.

*164 **Foundations of Mathematics for Teachers** (3)

Logic, set-theory, and foundations of the real number system. Prerequisite: Math 31 or equivalent.

171 **Vector Analysis** (3)

Microbiology

Chairman: L.F. Affronti, Professor of Microbiology; Ross Hall, Telephone 331-6531

†237 **Immunity and Infection** (1)

Emphasizes fundamental principles of infection and immunity as it relates to oral diseases of microbial origin.

†238 **Advanced Dental Immunology** (1)

Immunologic concepts related to physiological and biochemical bases of dental disease. Prerequisite: Micr 237.

Music

Chairman: George Steiner, Professor of Music; FF–10, Telephone 676-6245

3 **Introduction to Musical Understanding** (3)

Introductory history of musical styles, related to listening; elements and materials of music.

4 **Survey of Music Literature** (3)

Introductory study of musical forms, structures, and textures; aural analysis of selected literature.

* Open only to candidates for the degree of Master of Science for Teachers, teachers for in-service training, or students recommended by the Department of Education.
† Open only to students in the program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology.

Oceanography*

rogram Adviser: Hyman Orlin, Professorial Lecturer in Geodetic and Cartographic cience; Telephone 946-3557

11 Navigation (3)

Theory of navigation, charts, navigation aids, celestial navigation, shipboard instruments.

101–2 Elementary Oceanography (3–3)

Chemical and physical properties and composition of sea water, heat budget, distribution of variables, statics, dynamics, water masses, general circulation of the oceans, underwater sound, propagation of light, submarine topography, sea floor deposits, biological classifications, and marine ecology. Spectrum of ocean waves from capillary through tidal, including internal waves. Observations and reduction; history and interrelationships between marine sciences. Prerequisite to Ocea 102: Geol 1 or 3, or permission of instructor.

110 Physical Oceanography (3)

All aspects of physical oceanography except waves and tides. Subjects of physical and chemical properties of sea water, underwater sound, and propagation of light. Emphasis on hydrodynamic equations, statics and kinematics, currents, heat budget, turbulence, and the general circulation and water masses of oceans. Prerequisite: Math 32, Ocea 101; or permission of instructor.

111 Ocean Waves and Tides (3)

All aspects of waves and tides; survey of tidal theory and analysis. Prerequisite: Math 32, Ocea 101.

112 Biological Oceanography (3)

Biological science as related to marine environment. Prerequisite: Ocea 102.

113 Marine Geophysics (3)

Principles of geophysical measurements and interpretation, earthquake seismology, sound propagation, seismic refraction, and reflection at sea. Selected reflection and refraction studies offshore; geophysical investigations of some selected trenches. Prerequisite: Geop 105, Phys 1; or permission of instructor.

114 Chemical Oceanography (3)

Chemical processes in the marine environment, including composition of sea water, nutrients, natural composition and variation, carbonate cycle, geochemistry, and extraction. Prerequisite: Chem 12, Ocea 101; or permission of instructor.

115 Geological Oceanography (3)

Physiography of the sea floor and geological processes of the ocean basins and margins, properties and distribution of sediments and rates of deposition; distribution of minerals, structure and origin of the ocean basins. Prerequisite: Ocea 102.

ted with the Department of Geography and Regional Science.

120 **Coastal Ecology** (3)
Introduction to coastal ecosystems and how they function; the impact o
man's activities. Intensive discussion of the impact of specific, topica
activities.

Oral Biology

Program Adviser: E.A. Caress, Assistant Dean of the Graduate School of Arts and Sciences; Bacon 201, Telephone 676-6210

The courses listed below are open only to students in the program of study leading t the degree of Master of Science in Special Studies with a concentration in Ora Biology. This degree program is offered by the Graduate School of Arts and Science in cooperation with the Naval Graduate Dental School at the National Naval Medi cal Center, and the Army Institute of Dental Research at the Walter Reed Army Medical Center (see page 81).

201 **Research Methodology** (0)

202 **Oral Pathology** (3)

203 **Diagnosis** (3)

204 **Patient Management** (3)

205 **Topographic Anatomy of the Head and Neck and Anatomy of Medical Emergencies** (2)

206 **Hospital Dentistry** (1)

208 **Naval Administrative Management** (1)

260 **Biostatistics and Research Design I** (0)

261 **Biostatistics and Research Design II** (0)

262 **Military Management** (1)

263 **Behavior Modification Approaches to Dental Problems** (1)

265 **Analgesia** (1)

270 **Microanatomy of Normal and Pathologic Tissue I** (2)

271 **Microanatomy of Normal and Pathologic Tissue II** (3)

272 **Microbiology and Immunology** (3)

273 **Physiological Basis of Patient Treatment** (4)

275 **Dental Materials** (1)

276 **Seminar: Multidisciplinary Basic Science** (3)

295–96 **Research** (3–3)

Pharmacology

Chairman: H.G. Mandel, Professor of Pharmacology: Ross Hall, Telephone 331-6541

21–22 **Chemistry and Physics of Anesthesia** (3–3)

Fundamental concepts of physics, general and organic chemistry, and biochemistry and their application to medicine and anesthesiology, including chemistry of respiration, acid-base balance, clinical biochemistry and enzymology, hormones, radioisotopes, electronics, physicochemical properties of anesthetic agents, and other related topics.

110 **Pharmacological Basis of Anesthesia** (3)

Fundamental principles of pharmacology; drugs affecting the autonomic nervous system, central nervous system, and cardiovascular system; fundamentals of inhalation anesthesia; auxiliary drugs used in anesthesiology; other topics.

115 **Drug Abuse Education** (3)

Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems, legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana and other hallucinogenic and psychedelic drugs.

203 **Fundamental Principles of Pharmacology** (2)

Basic principles of pharmacology, including drug receptor interactions, structure activity relationships, pharmacokinetics, membrane phenomena, cellular control mechanisms, drug toxicity.

215 **Adolescent Drug Abuse** (3 or 4)

Primarily for teachers, counselors, and administrators. Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse.

216 **Drug Abuse Education Techniques** (3)

Primarily for teachers and counselors preparing to direct teacher and parent drug abuse education programs. Intensive review of current information on drug abuse, dynamics of group process, supervised practical experience. Prerequisite: Phar 215 and permission of instructor.

251 **Pharmacological Basis of Oral Therapeutics** (3)

Lectures and discussions on the clinical pharmacology of drugs used in the practice of dentistry; drug interactions; adverse reactions affecting the oral cavity.

253 **Selected Topics in the Pharmacology of Oral Therapeutics** (2)

Philosophy

Chairman: Thelma Z. Lavine, Elton Professor of Philosophy; Rice 611, Telephone 676-6266

50 **Introduction to Philosophy** (3)

Readings from major philosophers and study of philosophic positions from Plato to the present.

131 **Ethics** (3)

Theories of "the good" and "the right" from Plato to Sartre.

162 **Aesthetics** (3)

Nature of aesthetic experience, problems of appreciation and criticism in the arts, and theories of artistic creation. Emphasis on contemporary arts and criticism.

172 **American Philosophy** (3)

Philosophies of Peirce, Royce, James, Dewey, and Santayana as representatives of American thought.

193 **Contemporary Philosophy: Phenomenological** (3)

The phenomenological movement, including its development into German and French existentialism, and its more recent phases.

Physical Education, Health, and Recreation

Chairman: J.L. Breen, Professor of Physical Education; K-20, Telephone 676-6280

101 **Physical Education in the Elementary School** (3)

For Elementary Education and Physical Education majors. Child growth and development related to school and playground programs in movement. Philosophy, curriculum, techniques of teaching, and equipment evaluation.

119 **Creative Dance for Children** (3)

Study of dance as an expressive medium for children: emphasis on concepts and principles, methods and materials. Consideration given to dance for children with special education problems.

158 **Safety Education** (3)

Liability, prevention, and emergency care of all types of injuries with reference to first aid and athletics. Proper use of personnel, facilities, and equipment.

184 **Workshop** (1 to 3)

Workshops in Physical Education, Dance, and Recreation. Current problems, practices, and new approaches. Content of each workshop will depend on current needs. May be repeated for credit with permission of adviser.

202 **Conceptual Basis of Motor Learning** (3)

Theories of learning and application to development of motor skills.

250 **Administration of Urban Leisure Services** (3)

Planning and organization of a comprehensive system of urban leisure services utilizing educational, cultural, and recreational resources; emphasis on public relations, personnel administration and supervision, systems analysis, fiscal management and managerial accountability.

260 **Tourism Development** (3)

Socioeconomic analysis of demand for travel and tourism resources; techniques for planning and design; examination of current trends.

280 **Advanced Workshop** (1 to 3)

Workshops in Physical Education, Dance, and Recreation. Emphasis on contemporary issues and problems; development of advanced professional competencies. May be repeated for credit with permission of adviser.

Physics

Chairman: H.H. Hobbs, Professor of Physics; Corcoran 102, Telephone 676-6275

ASTRONOMY

9–10 **Introduction to Astronomy** (3–3) (Campus Course)

Lecture (2 hours), recitation (1 hour), laboratory (2 hours). Classical through modern astronomy with introduction to basic principles underlying astronomical systems and observations. Primarily for nonscience majors. Laboratory fee, $11 a semester.

PHYSICS

1 **General Physics** (4) (Campus Course)

Topics in classical physics which form a foundation for modern physics. Prerequisite: two years of college preparatory mathematics or concurrent registration for Math 6. Laboratory fee, $11.

2 **Introduction to Modern Physics** (4) (Campus Course)

Selected topics in modern physics, including relativity and quantum theory. Prerequisite: Phys 1 or equivalent. Laboratory fee, $11.

*3 **General Physics** (3)

Same as Phys 1 without laboratory.

†4 **Introduction to Modern Physics** (3)

Same as Phys 2 without laboratory.

ysiology

irman: R.A. Kenney, Professor of Physiology; Ross Hall, Telephone 331-6551

115 **Physiology for Nurse Anesthetists** (3)

Emphasis on respiratory, cardiovascular, and automatic nervous system physiology; a more general survey of other systems.

s course may not be taken by students who have completed, or are enrolled in, or plan to l in Phys 1.

s course may not be taken by students who have completed, or are enrolled in, or plan to l in Phys 2.

* 231 **Review of Oral Biology** (2)

Political Science

Chairman: H.L. LeBlanc, Professor of Political Science and Public Affairs; C-619. Telephone 676-6290

Departmental prerequisite: PSc 4 and 6 or 5 and 6 are prerequisite to courses in Political Science numbered from 101 to 200. Courses numbered from 201 to 300 are for graduate students who have the appropriate undergraduate course prerequisites.

4 **Introduction to Political Science** (3) (Campus Course)
The study of political behavior including the role of politics in today's world, the sources of elite and mass political behavior, and the influence and nature of political institutions. Students who receive credit for PSc 4 cannot receive credit for PSc 5.

5 **Introduction to Political Science** (3)
Introduction to the study of comparative political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies. Students who receive credit for PSc 5 cannot receive credit of PSc 4.

6 **Introduction to Political Science** (3)
Introduction to the study of the structure, powers, and processes of the American political system.

103 **State Politics** (3)
Theory and practice of American federalism, factors influencing state policy choices, state responsiveness to urban problems.

104 **Urban Politics** (3)
Demographic trends and implications, local metropolitan political systems, issues in urban politics, strategies of political change.

111 **Comparative Government and Politics** (3)
Government and politics of the principal constitutional democracies of Western Europe.

†112 **Comparative Government and Politics** (3)
Government and politics of the communist nations; emphasis on the Soviet Union and the countries of Eastern Europe.

117–18 **Political Theory: Major Issues of Western Political Thought** (3–3)
PSc 117: foundations of Western political thought—Plato to Aquinas.
PSc 118: philosophical roots of modern political order and disorder—Machiavelli to Rousseau.

119–20 **American Political Thought** (3–3)
Introduction to political thought in the United States from colonial times to the present.

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* Open only to students in the program of study leading to the degree of Master of Science in Special Studies with a concentration in Oral Biology.
† PSc 112 and 115 are related in their subject matter, and credit for only one may be applied toward a degree.

121–22 **U.S. Constitutional Law and Politics** (3–3)

PSc 121: separation of powers, federal-state relationships, economic regulation. PSc 122: political and civil rights. Prerequisite: junior status.

125 **Legislative Process** (3)

Study of Congress, including theories of representation, legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches.

126 **The American Presidency** (3)

Examination of the politics of Presidential selection, the authority of the contemporary institution, the mechanisms and processes for formulating public policy, and the influence of personality on performance in office.

145 **U.S. Political Parties and Politics** (3)

Party system and structure, role of ideology, voting behavior, campaigns and elections, devices for organizing the government.

151 **Public Administration and Public Policy-making** (3)

Examination of the process by which the federal government selects and implements public policies. Particular attention to the role of bureaucracies in the policy-making process. Criteria for the evaluation of public policy.

167 **U.S. Foreign Policy** (3)

Constitutional and political factors that determine the formulation, execution, and substance of U.S. foreign policy.

171 **International Politics** (3)

International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy.

172 **International Organizations** (3)

Development and operations of the United Nations, regional organizations, and functional international organizations.

181 **Public International Law and Organization** (3)

Survey of international law; emphasis on development and trends.

190 **Politics of Middle and Southern Africa** (3)

Comparative analysis of the political systems of selected countries of non-Mediterranean Africa.

191 **Governments and Politics of the Middle East** (3)

Domestic and international politics of the eastern Arab states, Turkey, Iran, and Israel.

192 **Governments and Politics of North Africa** (3)

Domestic and international politics of Algeria, Tunisia, Morocco, Libya, Egypt, Sudan; their relations with states of the Middle East.

193 **Governments and Politics of South and Southeast Asia** (3)

Domestic and international politics of the major states in the area.

194 **Governments of China and Japan** (3)

Institutions and processes of government in contemporary China and Japan, with some historical background. Attention to ideological forces. Students who receive credit for PSc 194 cannot receive credit for PSc 162.

204 **Urban Politics** (3)

Readings and discussions on patterns and implications of urban growth, local and metropolitan political systems, policy formation and change, conflict management, political constraints on social reform.

205 **Government, Science, and Technology** (3)

Examination of the demands on national and international political systems resulting from the impact of scientific and technological developments and of the responses of governmental institutions and processes to these demands.

209 **Presidential-Congressional Relations** (3)

Examination of the patterns of interaction between the executive and legislative branches; emphasis on policy-making roles and structures.

211–12 **Comparative Government and Politics** (3–3)

Problems of comparative political analysis; a comprehensive examination of the literature in comparative politics.

215–16 **Seminar: the Communist Camp in World Politics** (3–3)

Significant issues of communism, particularly in the Soviet Union and Red China; concept and structure of "world socialist system"; intra-Bloc relations with emphasis on the Sino-Soviet dispute.

220 **Congress and the Political System** (3)

Examination of the roles, structure, and function of political parties and interest groups as they relate to the legislative process.

222 **Judicial Policy-making and Civil Liberties** (3)

Examination of the role of the judiciary in policy formulation; emphasis on the U.S. Supreme Court and civil liberties issues.

223 **Defense Policy Analysis** (3)

Analysis of selected topics in U.S. defense policy.

239 **Economic Policy Analysis** (3)

Analysis of selected topics in U.S. monetary and fiscal policy.

240 **Legislative Theory and Behavior I** (3)

Selected problems of the U.S. legislative system at the national and state level. Emphasis on legislative recruitment, representative-constituency relations, policy-making and communication.

241 **Legislative Theory and Behavior II** (3)

Selected problems of legislative theory and behavior from a comparative perspective with particular reference to the parliamentary systems of West Germany, France, and Britain.

242 **Methods of Legislative Research** (3)

The process of empirical research: construction of research design, data

collection, and analysis. Techniques discussed will include content analysis, survey research, and analysis of institutional voting.

244 **Public Policy Analysis** (3)

Reading and research in systematic methods of public policy analysis.

247 **Legislative Elements in Economic Policy Development** (3)
(Formerly Economic Policy Analysis II)

Economic analysis of selected legislative issues and the effect of various economic pressures on policy outcomes.

248 **Public Opinion and Voting Behavior** (3)

Analysis of mass political attitudes and voting behavior.

249 **Domestic Policy Analysis—Selected Topics** (3)

Analysis of U.S. policy toward selected domestic problems.

259 **Foreign Policy Analysis—Selected Topics** (3)

Analysis of U.S. foreign policy toward selected world regions.

267 **Seminar: U.S. Foreign Policy (3)**

Research and selected reading as the basis for an analysis of the foreign policy of the United States, with particular reference to the decision-making process and the execution of policy.

288 **Seminar: Soviet Military Policy and Strategy** (3)

Soviet developments in military policy and strategy with attention to intra-Bloc military cooperation, political context of Soviet military policy, significant changes in recent Soviet military thought.

sychology

hairman: R.D. Walk, Professor of Psychology; GG-211, Telephone 676-6320

Departmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses Psychology. Six semester hours in Psychology courses are prerequisite to Psyology courses numbered above 100. The departmental prerequisite may be waived th the permission of the instructor.

1 **General Psychology (3)**

Fundamental principles underlying human behavior.

8 **Psychology of Motivation and Personality** (3)

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized.

22 **Introduction to Educational Psychology** (3)

The contributions of psychology to education; emphasis on learning.

29 **Psychology of Childhood** (3)

Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world.

101 **Abnormal Psychology** (3)

Causes, diagnosis, treatment, and prevention of various types of malad justments and mental disorders. Prerequisite: 6 semester hours in psy chology, or 3 in psychology and 6 in a biological science.

112 **Psychology of Adolescence** (3)

Psychological characteristics and problems peculiar to adolescence, with emphasis on applications of psychology to solution of such problems.

121 **Psychology of Learning** (3)

Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects.

129 **Theories of Personality** (3)

Survey of personality theories; emphasis on their application to problems of individuals.

131 **Psychological Tests** (3)

Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7.

144 **Personnel and Industrial Psychology** (3)

Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation, and productivity

145 **Psychology of Management** (3)

Psychological aspects of managing work organizations. Departmental prerequisite waived.

146 **Psychotechnology of Learning and Training** (3)

Psychological principles, concepts, and techniques of human learning and behavioral modification as applied to the design and operation of training and development systems.

151 **Social Psychology** (3)

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war.

156 **Psychology of Attitudes and Public Opinion** (3)

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare.

175 **Career Development in Youth and Maturity** (3)

Emphasis on the development of long-range career objectives based on review of experiences, the results of psychological testing, seminar discussion groups, and guided independent study. Analysis and practice of the specific skills needed to negotiate for advancement or to accomplish a career change. Credit for this course may not be applied toward a Bachelor's degree with a concentration in Psychology.

191 **Independent Research in Psychology** (3) (Campus Course)

Individual study and research for those desiring to graduate with honors or to pursue more specialized topics. Arrangements must be made with the Department of Psychology.

211 **Assessment of Cognitive Functioning** (3)

Concepts of intelligence and achievement and their assessment through a variety of group and individual procedures. Emphasis on evaluation of children. Material fee, $7. Admission by permission of instructor.

246 **Seminar: Personnel Measurement Techniques** (3)

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, and performance ratings.

Public Administration

Chairman: D.S. Brown, Professor of Management; Government 302, Telephone 576-6295

213 **Administration in Government** (3)

Critical analysis of federal administrative organizations as an integral part of the political system. Roles of Congress, the President, the courts, interest groups, political parties, and the public in the public decisional process. Special attention to centripetal and centrifugal forces.

215 **Comparative Administrative Systems** (3)

Examination and analysis of the administrative systems of selected foreign governments; attention to practices applicable to administration in the United States.

218 **Seminar: Developmental Administration II** (3)

Problem of the transfer of administrative capability from one country to another. Political and administrative development. Unilateral and multilateral approaches. The role of the innovator. Strategies of administrative development.

220 **Law, Responsibility, and the Public Administrator** (3)

Exploration and analysis of the legal and moral forces and factors which guide the administrator/manager in his decision-making. The role of the law, the courts, and the agency counsel. Understanding the several meanings of responsibility, including accountability.

221 **Management in the Executive Branch** (3)

Analysis of application of management theory and practice in the executive branch of the federal government; emphasis on staff responsibilities and relationships and internal organization and control.

223 **Behavioral Factors in Large Organizations** (3)

Analysis of the nature and characteristics of bureaucracy; dysfunctionalism; approaches to policy guidance and leadership, particularly in large public organizations; influence and control systems.

231 **Public Personnel Administration** (3)

Survey of basic principles and functions of personnel administration in the public service. Roles of personnel management, recruitment, placement, wage and salary administration, training, retirement, and other personnel functions.

232 **Problems in Public Personnel Management** (3)

Analysis and evaluation of major personnel management problems in government; employee-management relations; interagency and intergovernmental relationships. Impact of automation. Evaluation of personnel systems.

233 **Seminar: Manpower Development and Utilization** (3)

Examination of public and private manpower trends, problems, policies and programs. Exploration of approaches, old and new, to manpower development and utilization. Analysis of impact of economic, political, and social factors on manpower. Students will select a specific area for individual investigation.

235 **Technological Change and Manpower** (3)

Research, discussion, and readings dealing with manpower problems arising from automation and other technological changes. Evaluation of these developments in government and business; their implications for productivity, employment, training and education, and personnel and industrial relations. Analysis of economic, political, and social factors influencing public and private manpower policies.

245 **Managing the Changing Federalism** (3)

An analysis of organic changes in the administration and management of intergovernmental programs in a rapidly changing American federalism. Federal, state, regional, and locally-shared systems studied from theoretical and practical vantages.

246 **Dynamics of Citizen Participation in Administration** (3)
(Formerly Urban Dynamics and Citizen Participation in Administration)

Exploration of the dynamics of citizen participation in administration of metropolitan area programs. Analysis of the nature, costs, and benefits of selected cases of citizen and administrative association.

248 **Financing Metropolitan Services** (3)

Analysis of the structure and administration of public finance of local governments.

249 **Administration in Metropolitan Area Governments I** (3)

An ecological approach to understanding and managing urban processes and trends; exploration of economic, social, and political factors that affect metropolitan administration.

250 **Administration in Metropolitan Area Governments II** (3)

Examination of metropolitan governmental structures and functions, public and private demands on the system, decision-making in the urban complex, feedback and evaluation.

251 **Governmental Budgeting** (3)

Survey of the basic concepts, principles, and practices in governmental budgeting; interrelationship of planning, programming, and budgeting; their role in the management process.

252 **Problems in Planning, Programming, and Budgeting** (3)

Intensive analysis of developments in federal planning, programming, and

budgeting; application of new tools in the decision-making process; evaluation of the system.

254 **Seminar: Financial Management in the Federal Service** (3)

Functions and interrelationships of central federal financial management agencies, their policy, economic and managerial roles, controllership functions, and standards and practices in financial management.

260 **Policy Formulation and Administration** (3)

Analysis in depth of factors and processes involved in policy development, with particular attention to selected areas of national policy; development of agency goals and objectives.

262 **Seminar: Science, Technology, and Public Policy** (3)

The impact of science and technology upon public administration in terms of both administrative practice and national policies.

295 **Research Methodology** (3)

Survey of research methods; application to problems of public administration.

299 **Thesis Seminar** (3) (Campus Course)

Examination of thesis standards, research philosophy and methodology in public administration.

300 **Thesis Research** (3)

Religion

Chairman: R.G. Jones, Professor of Religion; O-11, Telephone 676-6325

9 **The Hebrew Scriptures** (3)
(Formerly The Old Testament)

Historical and literary study of the Hebrew Scriptures with consideration of development of religious ideas, institutions, and outstanding personalities.

10 **The New Testament** (3)

Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles.

21 **Introduction to Religious Thought** (3)

Traditional religious concepts, language of contemporary religion amidst modern scientific and secular intellectual tendencies, and the place of religion in today's society.

59–60 **History of Religions** (3–3)

Origins, evolution, and contemporary status in historical context. Rel 59: primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam).

127 **Medicine, Religion, and Healing** (1) (Campus Course)

Total care concept. Importance of religion in medical practice for patient and physician. Concept of the professional man, the clergy's role in healing, religious perspective on issues in medical ethics.

216 **Supervised Clinical Pastoral Education** (I-A) (6)

Full-time program of clinical pastoral education in an approved center. Involvement in the responsibility for pastoral ministry is reviewed and evaluated in a peer-group context.

217 **Supervised Clinical Pastoral Education** (I-B) (6)

A continuation of Rel 216 with emphasis on pastoral and personal identity, sustained pastoral relationships, and pastoral methods and skills.

218 **Supervised Clinical Pastoral Education** (III-A) (6)

Responsibility in pastoral ministry is increased with emphasis on group work, interprofessional involvement, use of specific counseling methods, work with persons with special problems. Prerequisite: Rel 216 and 217 or equivalent.

219 **Supervised Clinical Pastoral Education** (III-B) (6)

Continuation of Rel 218 with emphasis on examination and review of administrative procedures, design of pastoral programs, and development of a pastoral theology.

222 **Seminar: Christian Ethics** (3) (Campus Course)

Important tendencies in ethical reflection of the contemporary Christian Church; contributions of social sciences to that reflection.

223 **Religious and Ethical Perspectives on Medical Problems** (3)

Religious and ethical questions in medical problems and medically related issues.

225 **The Dynamics of Ministering to the Young Adult** (3)

Conceptual models of development of young adults from late adolescence: special problems of educational and military experience, vocational choice, marriage and the family, and physical, intellectual, emotional, and religious development. Encounter experience with persons and groups.

227–28 **Advanced Studies in Pastoral Care** (3–3)

History and present state of methodologies and conceptual models of pastoral counseling and leadership in groups; supervised work in interfaith and multidisciplinary ministries.

235 **Seminar: Roman Catholicism in the Modern World** (3) (Campus Course)

Important leaders and their ideas in selected developments since 1500—doctrinal, spiritual, biblical, liturgical, and ecumenical.

237 **Seminar: Theological Analysis** (3) (Campus Course)

Historical and topical study of the development of important ideas in such areas as Christology, soteriology, and ecclesiology.

299–300 **Thesis Research** (3–3) (Campus Course)

Slavic Languages and Literatures

Chairman: G.A. Olkhovsky, Associate Professor of Russian; Library 627, Telephone 676-6335

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Russian** (3–3) (Campus Course)

Beginners' course in fundamentals of grammar and pronunciation. Prerequisite to Slav 2: Slav 1. Laboratory fee, $17.50 a semester.

3–4 **Second-year Russian** (3–3) (Campus Course)

Intermediate course in Russian language. Prerequisite to Slav 3: Slav 1–2 or two years of high school Russian. Prerequisite to Slav 4: Slav 3. Laboratory fee, $17.50 a semester.

9–10 **Intermediate Russian Conversation and Composition** (3–3) (Campus Course)

Listening comprehension; oral and written practice. Prerequisite: Slav 4 or 6, or permission of instructor.

91–92 **Introduction to Russian Literature** (3–3)

Emergence and development of Russian literature and ideas during the 19th and early 20th centuries—in English.

109–10 **Advanced Russian Conversation and Composition** (3–3)

Developing proficiency in oral and written expression. Prerequisite: Slav 10 or equivalent.

161–62 **Russian Culture** (3–3)

Survey of Russian cultural heritage from origins of ancient Russia to present—in English. Lecture, recitation, discussion, and individual reports on assigned topics.

165 **Soviet Literature from the Revolution to World War II** (3)

Basic themes, issues, literary figures of the Soviet 1920's. The fate of literature and writers under increasing state control; Five-year Plan literature. Lecture, discussion, reports—in English.

166 **Soviet Literature from World War II to the Present** (3)

Literature in wartime, under Stalinism, and in the "thaws." The new generation of dissident liberals and "underground" literature. Lecture, discussion, reports—in English.

193–94 **The Other Slavs: Their Literature—in English** (3–3)

An examination of non-Russian Slavic literatures from their beginnings to the present day. Emphasis on themes, ideas, and styles peculiar to each literature.

Sociology

Chairman: R.G. Brown, Professor of Sociology; D-201, Telephone 676-6345

Departmental prerequisite: Soc 1 is prerequisite to all other courses in Sociology numbered below 200.

1 **Introductory Sociology** (3)
General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior. Survey of fields within sociology.

2 **Uses of Sociology** (3)
(Formerly American Social Problems)
Introduction to the various methods by which sociologists have approached the investigation of social phenomena.

101 **Development of Social Thought** (3)
(Formerly Soc 61)
Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century.

110 **The Sociology of Work** (3)
Introductory survey of industrial sociology; sociology of occupations and professions; industry-community relations; and analysis of large, complex organizations.

124 **Medical Sociology** (3)
Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services.

126 **Urban Sociology** (3)
Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development.

127 **Population Problems** (3)
Composition of populations, trends in population growth and population pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control.

129 **Race and Minority Groups** (3)
Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice.

130 **Class, Status, and Power** (3)
(Formerly Social Stratification)
Analysis of distribution of resources and opportunities for participation, education, and social mobility in American society; international comparison; analysis of public policies which affect these distributions.

131 **Law and Morality** (3)
Law is highly organized control of human behavior through rules. As such it is in constant connection with moral principles. This course is

designed to explore the connections between law and morality; particularly on issues such as the justification for maintaining prohibitions against morals offenses, the proper aims of criminal justice, and the legal and moral support for civil disobedience.

132 **Political Sociology** (3)

Analysis of problems involved in the study of power relations in society; distribution of power in society; types and processes of government; political participation and political mobilization.

134 **Marriage and the Family** (3)

Courtship as a social process, marriage and marital adjustment, development of the family, parent-child relations, family problems, disorganization, divorce, and family reorganization.

135 **Juvenile Delinquency** (3)

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders.

136 **Criminology** (3)

Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions in urban society.

137 **Sociology of Law** (3)

Law as a social phenomenon and agency of social control. Problems of legal concepts, doctrines, and institution. Prerequisite: Soc 136.

139 **Society and the Deviant** (3)

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools.

141 **Social Research Methods** (3)

Introduction to scientific method in the development of social theory and the solution to social problems. Prerequisite: Stat 53 or former 104.

144 **Public Opinion and Mass Communication** (3)

Communication process with emphasis on international communications, propaganda, and mass media; measurement of propaganda campaigns.

147 **Problems of Bureaucratic Organization** (3)

Analysis of theories of and behavior in large, bureaucratic organizations and their impact on American social life. Supervised work-practice in the Washington, D.C. community.

149 **Modern Sociological Theory** (3)

Systematic study of contemporary schools of sociological theory, both European and American development; evaluation of scientific contributions of each school. Prerequisite: Soc 101.

191 **Current Emphases in Sociology** (3)

Analysis and evaluation of recent developments in the general field of sociology. Topic changes each semester; may be repeated for credit.

201 **Concepts of Sociology** (3)
Systematic survey, critical analysis of sociological concepts. Emphasis on theoretical systems.

210 **Theoretical Foundations of Political Sociology** (3)
Sociological theory on the relationship of politics to the wider social system. Emphasis on concepts of power, alienation, ideology, political stability, conflict, and change.

211 **Seminar: Social Change** (3)
Comparative study of political processes concentrating on political development in Third World Nations.

227–28 **Seminar: Urban Social Problems** (3–3)
Multidisciplinary seminar which examines the value context, strategies, and programs currently applied to the solution of major urban problems with emphasis on the various perspectives and approaches developed through the social sciences, principally sociology. Soc 227: discussion and analysis of the development of social science approaches in contrast to other approaches. Soc 228: discussion and analysis of the current problems of interest and concern to students in the seminar. It is recommended that Soc 227 be taken before Soc 228.

248 **Seminar: Organizational Theory and Behavior** (3)
Advanced analysis of theory and behavior in complex organizations relative to defining organizations, examining basic social processes and their relationship to the cultural environment.

270 **Educational Sociology** (3)
Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components.

271 **Sociology of the Youthful Offender** (3)
Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders.

272 **Social Disorganization** (3)
Analysis of factors contributing to disruption of social groups, institutions, and communities; study of attempts to establish social controls to prevent, minimize, or mitigate the effects of socially disruptive conditions and events.

273 **Deviant Behavior** (3)
Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools.

Spanish*

Chairman: J.F. Burks, Professor of French; Monroe 429, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must

* Administered by the Department of Romance Languages and Literatures.

ake a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Spanish** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year Spanish** (3–3) (Campus Course)

A year course: credit toward a degree at this University given on completion of Span 4. Conversation, grammar, composition, reading of modern Spanish prose, introduction to Hispanic civilization. Aural training, oral practice in language laboratory. Prerequisite: Span 1–2, or two years of high school Spanish. Laboratory fee, $17.50 a semester.

pecial Education

hairman: Perry Botwin, Professor of Special Education; C-429, Telephone 676-6170

170 **Interpersonal/Intrapersonal Relationships for Special Education Teachers** (3)

Consideration of factors leading to successful interaction with children.

200 **Understanding Young Exceptional Children** (3)

Lecture and field experience. Application of the basic concepts of early child development as applied to special education.

201 **Introduction to Special Education** (3)

Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accommodate children in a school program.

222 **Special Education in the Regular Classroom** (3)

Special techniques and materials for regular classroom teachers to assist children who have learning and or behavior problems; emphasis on specific, practical strategies and applications. Open to undergraduate seniors.

240 **The Crisis-Resource Teacher** (3)
(Formerly Educational Programming for Children with Behavioral Problems)

Rationales, operational models, techniques, and problems relevant to the implementation of crisis-resource teacher programs.

241 **Preprofessional Internship: Crisis-Resource Teaching** (6)

Practicum experience early in the training sequence in crisis-resource teaching. Under the direction of qualified teachers in a field setting. A minimum of 280 clock hours required.

242 **Specialized Techniques and Materials for Crisis-Resource Teachers** (3)
(Formerly Clinical Teaching of Children with Behavioral Problems)

Lectures, discussions, techniques, and selected materials exploring the

psycho-educational factors used in crisis-resource teaching. Admission by permission of instructor.

250 **Specialized Techniques and Materials for Diagnostic-Prescriptive Teachers** (3)
Selected materials and techniques used in diagnostic-prescriptive teaching. Must be taken concurrently with SpEd 252. Admission by permission of instructor.

251 **Psychosocial Factors in Special Education** (3)
(Formerly Psychosocial Factors in Diagnostic-Prescriptive Teaching)
Psychosocial factors significant to the process of the special education school-based consultant. Admission by permission of instructor.

252 **Preprofessional Internship for Diagnostic-Prescriptive Teachers** (6)
Supervised school experience in diagnostic-prescriptive teaching. Must be taken concurrently with SpEd 250. Admission by permission of instructor. A minimum of 280 clock hours required.

253 **The Humanizing Curriculum and the Special Education Consultant** (3)
(Formerly The Humanizing Curriculum in Diagnostic-Prescriptive Teaching)
Curriculum concepts and modification aimed at enhancing the classroom environment for learning and growth. Admission by permission of instructor.

260 **The Assessment Process: Identification and Psycho-educational Assessment of Young Exceptional Children** (3)
(Formerly Identification and Assessment of the Educational Needs of Young Children)
Lectures, demonstrations, and clinical practice in formal and informal assessment procedures. Admission by permission of instructor.

261 **The Teaching/Learning Process: Methods and Materials for Young Exceptional Children** (3)
(Formerly Methods for Teaching Young Impaired Children)
Clinical practice in the designing of educational strategies and materials, taught in a special education setting. Admission by permission of instructor.

262 **Seminar: the Education of Young Exceptional Children** (3)
Weekly seminar dealing with experiences, problems, and concerns encountered during the internship for the education of young exceptional children. Must be taken concurrently with SpEd 292. Admission by permission of instructor.

263 **Introduction to the Education of the Severely and Multiply Handicapped** (3)
Survey of the characteristics and learning patterns of children with severe disabilities. Lecture and field experience.

264 **Advanced Study in the Special Education of Severely and Multiply Handicapped Children** (3)
Specialized programs, techniques, and methods for teaching children with severe disabilities.

266 **Problems in Language Development in Exceptional Children** (3)

Introduction to the study of language acquisition and the application of current research on language of handicapped children.

267 **The Role of the Early Childhood Special Educator** (3)

Examination of the spectrum of roles available in early childhood special education; emphasis on role expectations and psychosocial dynamics of the various settings.

268 **The Development of Young Exceptional Children with Emphasis on Handicapping Conditions** (3)

(Formerly Pre-school Planning for Children with Disabilities)

Lecture (2 hours), site visitation (3 hours), discussion (2 hours).

269 **Psychosocial Concerns of the Early Childhood Special Educator** (3)

(Formerly Clinical Teaching in Early Childhood Education)

Seminar involving student presentations focusing on sociological and psychological constructs relevant to interpersonal/intrapersonal relationships.

270 **Adapting the Early Childhood Curriculum to Meet Special Needs** (3)

Review of the basic curriculum areas as they relate to the development of readiness skills in special education.

291 **Practicum in Crisis-Resource Teaching** (9)

Supervised field experience in the crisis-resource teacher program. Under the direction of a qualified teacher and the suprvision of the University staff. Minimum of 420 clock hours required.

292 **Professional Internship in Education of Young Exceptional Children** (9)

(Formerly Practicum in Teaching Young Children in Special Education (6))

Supervised internship in the education of young exceptional children. A minimum of 420 clock hours required. Must be taken concurrently with SpEd 262.

294 **Practicum in Diagnostic-Prescriptive Teaching** (9)

Supervised field experience in diagnostic-prescriptive teacher programs. A minimum of 420 clock hours required. Admission by permission of instructor.

303 **Administration and Supervision of Special Education** (3)

Philosophy and nature of special education; litigation program organization, administration, and development. Surveying local-level needs; program evaluation and supervision. Admission by permission of instructor.

304 **Recent Research and Trends in Special Education** (3)

Emphasis on research methodology and considerations. The unique problems of doing research in special education. Procedures and sources for obtaining research funding. Admission by permission of instructor.

306 **The Design of Family Education Programs: Theory and Practice** (3)

(Formerly Counseling Families of Children with Special Needs)

Theoretical foundations and clinical practice in working with parents and community agencies in meeting the educational needs of young exceptional children.

350 **The Diagnostic-Prescriptive Teacher** (3)

Rationale, operational models, techniques, and problems relevant to implementation of diagnostic-prescriptive teacher programs. Admission by permission of instructor.

351 **Seminar: School-based Consultants in Special Education** (3)
(Formerly Seminar for Diagnostic-Prescriptive Teachers)

Current practices in regular and special education as they affect the school-based consultant; emphasis on concurrent field experience. Admission by permission of instructor.

352 **Seminar: Special Education Consultant Programs in the Schools** (3)

For school-based consultants in special education; focuses on in-school program development and recent trends in processes and procedures. Admission by permission of instructor.

370 **Intrapersonal Dynamics in Special Education** (3)

Small group exploration of intrapersonal factors essential to understanding roles and interpersonal techniques in teaching exceptional children. Admission by permission of instructor.

Speech and Drama

Chairman: L.S. Bowling, Associate Professor of Speech and Hearing. Auditorium 6. Telephone 676-6350

1 **Communicative Speaking and Listening** (3)

Basic theories and principles of speech communication; composition, delivery, and criticisms of speaking in interpersonal, group, and public situations. Recording fee, $2.

11 **Voice and Diction** (3)

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4.

32 **Oral Interpretation of Literature** (3)

Theory and practice in discovering and communicating orally the meaning in literature through analysis of form and content. Techniques of reading prose, poetry, and drama for listeners. Prerequisite: Sp&D 11. Recording fee, $2.

45 **Understanding the Theatre** (3)

The art of the theatre; its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through lectures, visiting artists, class discussions, and attendance at theatrical performances. Primarily for nonmajors.

91 **Parliamentary Procedure and Group Participation** (3)

Principles and procedures for effective speech communication to function successfully at various levels of responsibility in academic, social, professional, civic, or business organizations. Prerequisite: Sp&D 1 or 11, or permission of instructor.

*111 **Business and Professional Speaking** (3)

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors.

121 **Group Discussion and Conference Leadership** (3)

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: Sp&D 1 or permission of instructor.

Statistics

Chairman: Jerome Cornfield, Professor of Statistics; C-311, Telephone 676-6356

Departmental prerequisite: One entrance unit in algebra is prerequisite to courses in Statistics numbered below 100.

†51 **Introduction to Business and Economic Statistics** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18.

53 **Introduction to Statistics in Social Science** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests by hypotheses, correlation, analysis of variance. Laboratory fee, $18.

101–2 **Basic Principles of Statistical Methods** (3–3)

Variables and attributes, averages and dispersion, elementary principles of sampling, introduction to the making of statistical decisions. Prerequisite to Stat 102: Stat 101.

105 **Statistics in the Behavioral Sciences and Education** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Advanced study of statistical techniques for research problems. Analysis of variance, correlation techniques, nonparametric techniques, sampling theory. Prerequisite: Stat 53 or former 104. Laboratory fee, $18.

111 **Business and Economic Statistics I** (3) (Campus Course)

Statistical processes as tools in decision-making in areas of economics and business. Admission by permission of instructor.

112 **Business and Economic Statistics II** (3) (Campus Course)

Case work to illustrate quantitative procedures for solution of economic and business problems. Prerequisite: Stat 111 or equivalent.

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course can be adapted to the needs of a specific group.
101–2, *Basic Principles of Statistical Methods* (3–3), which is offered off campus, may be limited.

APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property or which obstruct or interfere with normal and necessary University activities this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal† as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of The George Washington University as soon after order is restored as is practicably possible.

* The University Senate has been renamed the Faculty Senate.
† The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

*Rescinded January 18, 1973.

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

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COLLEGES AND SCHOOLS—DEGREE PROGRAMS

COLUMBIAN COLLEGE OF ARTS AND SCIENCES: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Geodetic and Cartographic Science (B.S. in Geod. and Cart.Sc.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.Forens.S.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S. in Forens.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S.), Bachelor of Science (B.S.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), Master of Comparative Law (M.Comp.L.), Master of Comparative Law (American Practice) (M.Comp.L.(Am.Prac.)), and Doctor of Juridical Science (S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil Engineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S. (E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Master of Engineering Administration (M.E.A.), Master of Science (M.S.), and Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION: Bachelor of Arts in Education (B.A. in Ed), Bachelor of Science in Physical Education (B.S. in P.E.), Master of Arts in Education (M.A. in Ed.), Master of Arts in Teaching (M.A.T.), Education Specialist (Ed.S.), and Doctor of Education (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Business Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Adm.), Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Master of Arts in Government (M.A. in Govt.), Master of Arts in Health Care Administration (M.A. in H.C.A.), Master of Business Administration (M.B.A.), Master of Public Administration (M.P.A.), Master of Science in Administration (M.S. in Adm.), Master of Urban and Regional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Certificate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Business Administration (D.B.A.), and Doctor of Public Administration (D.P.A.)

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A.) and Master of Arts (M.A.)

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THE GEORGE WASHINGTON UNIVERSITY

COLUMBIAN COLLEGE OF ARTS AND SCIENCES, 1821

THE GRADUATE SCHOOL OF ARTS AND SCIENCES, 1893

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES, 1825

THE NATIONAL LAW CENTER, 1865

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

THE SCHOOL OF EDUCATION, 1907

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

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THE DIVISION OF UNIVERSITY STUDENTS, 1930

THE COLLEGE OF GENERAL STUDIES, 1950

THE SUMMER SESSIONS, 1906

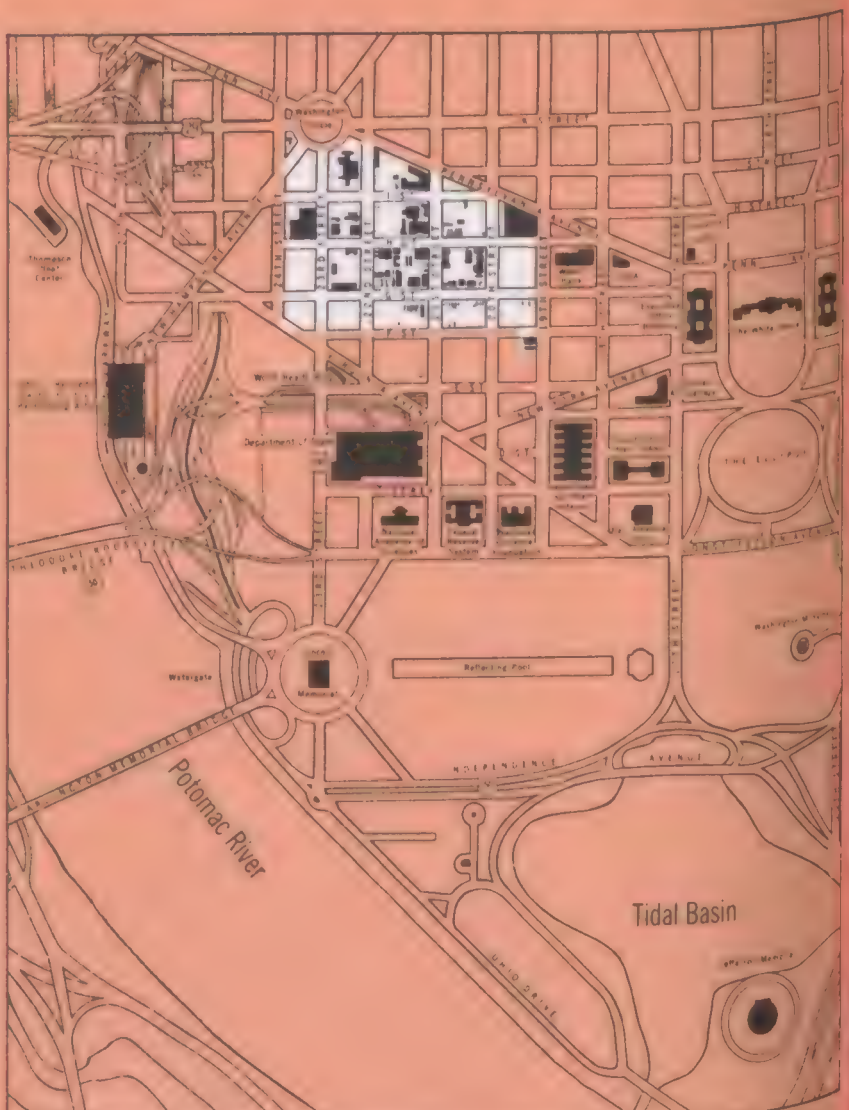
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SUMMER
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1974



/ WASHINGTON, D.C.

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THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE SUMMER SESSIONS 1974

WASHINGTON, D.C. 20006

FACTS ABOUT GEORGE WASHINGTON UNIVERSITY

General Information	Private, nonsectarian, coeducational, founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of Students 1973 Summer Sessions	5,509 (3,339 men, 2,170 women)
Geographical Origin of Students 1973 Summer Sessions	50 states, District of Columbia, Canal Zone, Puerto Rico, Virgin Islands, 80 foreign countries
Number of Full-time Faculty 1973 Summer Sessions	219
Number of Part-time Faculty 1973 Summer Sessions	102
Residence Hall Rates 1974 Summer Sessions	Multiple occupancy, $150 a five-week session; single occupancy, $200 a five-week session (see pages 23–24)

Undergraduate majors: Accounting, Allied Health Sciences (Physician's Assistant), American Civilization, American Literature, Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology, Botany, Business Administration, Cartography, Chemistry, Chinese Language and Literature, Chinese Studies, Civil Engineering, Classical Archaeology and Anthropology, Classical Archaeology and Classics, Classical Humanities, Dramatic Art, Economics, Electrical Engineering, Elementary Education, English Literature, Environmental Health, Environmental Studies, Fine Arts, French Language and Literature, Geodesy, Geography, Geology, Germanic Languages and Literatures, History, International Affairs, Journalism, Judaic Studies, Latin, Latin American Studies, Mathematical Statistics, Mathematics, Mechanical Engineering, Medical Technology, Music (Applied, History and Literature, Theory), Oceanography, Philosophy, Physical Education, Physics, Political Science, Premedicine, Psychology, Public Affairs, Religion, Russian Language and Literature, Russian Literature and Culture—in Translation, Secondary Education, Sociology, Spanish American Literature, Spanish Language and Literature, Speech Communication, Speech Pathology and Audiology, Urban Affairs, Zoology.

Study leading to graduate or professional degrees is offered in the Graduate School of Arts and Sciences, the National Law Center, the School of Medicine and Health Sciences, the School of Engineering and Applied Science, the School of Education, the School of Government and Business Administration, and the School of Public and International Affairs.

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A SUMMER SEMESTER IN THE NATION'S CAPITAL

THE GEORGE WASHINGTON UNIVERSITY offers a two-term summer program which makes it possible for students to earn 14 semester hours of credit during the summer months. The Library, classrooms, and residence hall are air-conditioned. For term dates, see the calendar on pages 5 and 6.

CALENDAR FOR THE 1974 SUMMER SESSIONS

Application for Graduation—An "Application for Graduation" form *must* be filed and the appropriate fee paid at the time of registration for the summer session of the senior or final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) September 30, 1974, provided they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

GRADUATE SCHOOL OF ARTS AND SCIENCES

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

DIVISION OF UNIVERSITY STUDENTS

First Session

June 3	Registration for first 5-week session and 7-week courses (10 am–7 pm) *Monday*
June 4	First 5-week session classes and 7-week courses begin *Tuesday*
June 19	D.B.A., D.P.A., and Ph.D. dissertations completed in the summer due in appropriate Dean's Office *Wednesday*
July 4	Holiday *Thursday*
July 9	First 5-week session classes end *Tuesday*
July 10	First 5-week session examination day *Wednesday*
July 22	Seven-week courses end *Monday*
August 14	Master's theses completed in summer due in appropriate Dean's Office *Wednesday*

Second Session

July 11	Registration for second 5-week session (10 am–6 pm) *Thursday*
July 12	Second 5-week session classes begin *Friday*
August 14	Master's theses completed in summer due in appropriate Dean's Office *Wednesday*
August 15	Second 5-week session classes end *Thursday*
August 16	Second 5-week session examination day *Friday*

NATIONAL LAW CENTER

May 28	Registration for all sessions (12–7 pm) *Tuesday*
May 29	First session and 13-week session begin *Wednesday*
July 4	Holiday *Thursday*
July 5	First-session classes end *Friday*
**July 8–10*	First-session examination period *Monday–Wednesday*
July 11	Registration for students attending second session only (2–6 pm) *Thursday*
July 12	Second-session classes begin *Friday*
August 21	Last day of classes *Wednesday*
August 22–24	Second-session and 13-week session examination period *Thursday–Saturday*

SCHOOL OF EDUCATION

June 17	First 3-week workshop session registration (10 am–7 pm); classes begin *Monday*
July 4	Holiday *Thursday*
July 5	First 3-week workshop session classes end *Friday*
July 8	Second 3-week workshop session registration (9 am–6 pm); classes begin *Monday*
July 8	Six-week session registration (9 am–6 pm); classes begin *Monday*
July 8	Ed.D., Ed.S., and M.A. in Ed. July comprehensive examination applications due *Monday*
July 20	National Teacher Examinations *Saturday*
July 26	Second 3-week workshop session classes end *Friday*
July 27	Ed.D., Ed.S., and M.A. in Ed. comprehensive examinations *Saturday*
July 29	Third 3-week workshop session registration (9 am–5 pm); classes begin *Monday*
August 16	Six-week session and third 3-week workshop session classes end *Friday*
August 16	Ed.D. dissertations completed in summer due *Friday*

FALL SEMESTER 1974–75

August 29–31	Registration *Thursday–Saturday*

* Classes scheduled Wednesday evenings for the 13-week session will meet on Wednesday, July 10.

THE UNIVERSITY

TORY AND ORGANIZATION

E GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Colum- n College in the District of Columbia. The name of the institution was nged in 1873 to Columbian University and in 1904 to The George Wash- gton University. The debt of the University to George Washington, whose me it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted on the establishment of a National University in the federal city. There he ged that, while being instructed in the arts and sciences, students from all rts of the country would acquire the habits of good citizenship, throwing off al prejudices and gaining at first hand a knowledge of the practice, as well the theory, of republican government. To further the materialization of his es, Washington left a bequest of fifty shares of The Potomac Company wards the endowment of a University to be established within the limits of District of Columbia, under the auspices of the General Government, if government should incline to extend a fostering hand towards it." The ngress never extended "a fostering hand." The Potomac Company passed of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great sionary urge and the need for a learned clergy, a group of dedicated nisters and laymen sponsored a movement for the establishment of a college the District of Columbia. Inspired largely by the zeal and energy of the erend Luther Rice, they raised funds for the purchase of a site and peti- ned Congress for a charter. After much delay and amendment, Congress nted a charter which was approved by President Monroe on February 9, 21. To safeguard the College's nonsectarian character it provided "that per- ns of every religious denomination shall be capable of being elected Trustees; shall any person, either as President, Professor, Tutor or pupil, be refused mittance into said College, or denied any of the privileges, immunities, or antages thereof, for or on account of his sentiments in matters of religion." During the entire time when the institution was known as Columbian Col- e, its activities were centered on College Hill, a tract of forty-six and a half es between the present Fourteenth and Fifteenth Streets extending north m Florida Avenue to somewhat beyond Columbia Road. The Medical School s located downtown. For the better part of the Columbian University period, e buildings of the University were situated along H Street between Thirteenth d Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. Within a few blocks are the White House, the Department of the Interior, the State Department, the World Bank, and many other governmental offices and international agencies. The area is not without its reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine and Health Sciences, Engineering and Applied Science, Education, Government and Business Administration, and Public and International Affairs; the Division of University Students; the College of General Studies; the Summer Sessions; and the Division of Experimental Programs.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

The National Law Center is a charter member of the Association of American Law Schools and is approved by the Section of Legal Education and Admissions to the Bar of the American Bar Association. The School of Medicine is a member of the Association of American Medical Colleges and is one of the medical colleges which have been continuously approved by the American Medical Association. Curricula of the School of Engineering and Applied Science in Civil, Electrical, and Mechanical Engineering are accredited by the Engineer's Council for Professional Development. The School of Education is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education for its Bachelor's and Master's degree programs. The School of Government and Business Administration has maintained full membership in the Middle Atlantic Association of Colleges of Business Administration since 1961. It joined the Council on Graduate Education for Public Administration in 1966. By invitation, in 1968, the School became a charter academic member of the American Association of Collegiate Schools of Business Assembly. The programs in Public Accounting designed to prepare students for Certified Public Accountants examinations have been approved by the state boards of New York and of Maryland. The Program in Hospital Administration is accredited by the National Accrediting Commission on Graduate Education for Hospital Administration. The Department of Chemistry is on the approved list of the American Chemical Society. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association.

EDUCATIONAL FACILITIES

The University Library.—The University Library contains approximately 300,000 volumes and, with the exception of the law and medical collections, is housed in the Library Building.

Regulations governing the use of the Library, the circulation of books, and the use of reserve books and periodicals are available at the service desks of the Library.

Other Library Facilities in Washington.—The student has access also to the Library of Congress, the Public Library of the District of Columbia and its branches, the Library of the Pan American Union, the Library of the Bureau of Railway Economics, the Library of the United States Department of Agriculture, the Library of the United States Office of Education, the National Library of Medicine, the Library of the Smithsonian Institution, and many other great special collections of the government departments.

Research Facilities of Washington.—The arrangement of the summer schedule of classes permits the full-time student to avail himself of the opportunity to study, at first hand, the working of the federal government and so to form a background for intelligent and useful citizenship.

In the departmental libraries of the federal government are a multitude of reports made by eminent specialists in all fields of science on the results of study and research in the bureaus, experimental stations, laboratories, museums, and observatories of the nation.

In addition to the governmental collections the student has available the research facilities of such scientific and educational groups, whose headquarters are situated in Washington, as the Carnegie Institution, the American Council on Education, the National Academy of Sciences, the National Research Council, the National Education Association, and the National Geographic Society.

CONSORTIUM OF UNIVERSITIES OF THE WASHINGTON METROPOLITAN AREA, INC.

The universities in Washington, D.C.—American University, Catholic University of America, *George Washington University*, Georgetown University, and Howard University—are associated in a Consortium through which they coordinate the use of their respective facilities; District of Columbia Teachers College, Gallaudet College, and Trinity College are associate members of the Consortium. Students in approved programs leading to degrees in any one of these institutions have the opportunity to select from the combined offerings of all the particular courses which best meet their needs.

Participation is limited to campus degree candidates. The following, however, are excluded: students in Canon Law, Law, Dentistry, Medicine, and Theology.

In special courses such as private instruction (as in music or art) or tutorial study, if a special fee is charged, this fee is not covered by the Consortium agreement and must be paid by the individual student to the institution administering the course. *A student may not take courses at another institution that are available at his own.*

The student registers and pays at his own institution for all Consortium courses.

See page 17 for information concerning registration for Consortium courses.

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Bjorn Karsten Netland, M.A., *Assistant Dean of the Division of University Students*

Ruth H. Osborn, Ed.D., *Assistant Dean of the College of General Studies, for Continuing Education for Women*

Lawrence Winkler, M.A., Ed.D., *Assistant Dean of the Summer Sessions*

THE SUMMER SESSIONS

THE PROGRAMS OF THE SUMMER SESSIONS have been planned to meet the needs of full- and part-time students.

During the summer of 1974, Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Engineering and Applied Science, the School of Government and Business Administration, the School of Public and International Affairs, and the Division of University Students offer courses in two 5-week sessions, with some graduate seminars and courses extending over an 8-week period. The School of Engineering and Applied Science also offers courses in a 7-week period. The National Law Center offers courses in three sessions, and the School of Education offers courses in 6- and 9-week sessions and three 3-week workshop sessions. The School of Medicine and Health Sciences offers undergraduate courses in an 11-week period for the Physician's Assistant program.

The time at which each course is offered (session and hours) is stated at the end of the course description.

Admission

APPLICATION FOR ADMISSION OR READMISSION

THE APPLICATION FOR ADMISSION to degree candidacy should be accompanied by the appropriate application fee ($10, undergraduate; or $25, graduate). There is no application fee for the student who is applying for nondegree status in the Division of University Students.

NONDEGREE STATUS

Application for nondegree status in the Division of University Students should be received, with any required credentials, by the Friday before the registration date of the session for which admission is sought (see Calendar, pages 5 and 6).

DEGREE CANDIDACY

Students from secondary schools wishing to begin college as degree candidates, in either the first or second term of the summer session, should apply during

the fall term of the senior year. Preference will be given to students who submit applications and required credentials prior to March 1.

Undergraduate transfer students from other institutions, applicants for graduate programs, and *readmission applicants* must submit application and required credentials prior to May 1 for the first summer session and June 1 for the second summer session.

Records presented become the property of the University and *cannot* be returned.

APPLICATION FORMS

The tearout postcard form inside the back cover of this catalogue may be used to request the Dean of the Summer Sessions to furnish the appropriate form for admission or readmission to the University for nondegree status or for a degree program. Students who attended the University in the spring semester of 1974 do not need to reapply to attend the Summer Sessions.

THE STUDENT NOT SEEKING A DEGREE

The student not seeking a degree from this University should complete application for admission to the Division of University Students. (See paragraph above.) This nondegree-granting division makes the work of the University available to five types of applicants, in accordance with the following requirements:

1. The student registered for a program leading toward a degree at another institution is admitted to the extent that facilities permit. No transcript of record is required unless the student has been subject to academic or disciplinary action. The student must be in good standing and eligible to continue in the institution last attended during the past academic year.*

2. The student over 21 years of age who is not working for a degree in this or another institution may be admitted to take courses for which he has adequate preparation, as determined by the department concerned. A transcript of record is not usually required. However, the student must be able to affirm that he is in good standing and eligible to continue in the institution last attended during the past academic year.*

3. Applicants under 21 years of age who have graduated from high school within the previous two years and who have not attended a college or higher institution may be admitted if they meet the entrance requirements of Columbian College of Arts and Sciences (see pages 26–27).

4. Under special conditions, recent secondary school graduates under 21 years of age who have been accepted by a regionally accredited university or college for the fall semester of 1974 may be admitted for the *summer session* only without filing a transcript if they submit a photostatic copy of their letter of unconditional acceptance.

5. Secondary school students applying for admission to the Secondary School Honors Program may be admitted in accordance with the requirements stated on pages 47–48.

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*No student is eligible for admission if he has been suspended within the past academic year.

THE STUDENT SEEKING A DEGREE

An applicant from a secondary school must

1. Send to his high school principal the high school record form provided by the University, with the request that the completed form be mailed *to the Office of Admissions.*

2. Request that a report of College Entrance Examination Board test scores be sent to the Office of Admissions directly from the Educational Testing Service, Princeton, N.J., or Berkeley, Calif. Every applicant is required to submit scores on the Scholastic Aptitude Test and the English Composition Achievement Test. In addition, an Engineering applicant must take the Mathematics Test (Level I or II).

The College Entrance Examination Board tests are preferred; however, the American College Testing battery scores will be accepted. The applicant should request that these scores be sent to the Office of Admissions directly from the American College Testing Program, Iowa City, Iowa. It is recommended that the applicant take the tests in October of the senior year.

An applicant who has attended one or more institutions of higher learning must request each registrar to mail to the Office of Admissions a transcript of his record, even though credits were not earned. An honorable dismissal is required from the institution last attended.

The report of the Graduate Record Examination, the Miller Analogies Test, or the Admission Test for Graduate Study in Business, where applicable, should accompany application to graduate degree candidacy.

Registration

A STUDENT MAY NOT REGISTER FOR CLASSES until admission to the University has been approved by the appropriate office.

A student previously registered in this University who was not registered for campus courses during the spring semester preceding this registration must apply for and receive a letter of readmission from the Office of Admissions (undergraduate and nondegree) or appropriate Dean's Office (graduate), before he is eligible for registration.

Registration days and hours are stated in the calendar at the front of this catalogue. All students registering on June 3 and July 11 should report first to the first floor of Building K, 817 23rd Street, N.W., where they will be given materials and detailed information concerning registration procedures. On all other registration dates (Law excluded), packets will be distributed from the Office of the Registrar, Rice Hall, 2121 Eye Street, N.W.

Degree candidates in Law secure their registration packets and instructions at the Office of the Dean of the National Law Center, Stockton Hall, 720 Twentieth Street, N.W.

Students planning to take courses in the first session and also in other sessions later in the summer may register at the first registration for *all* summer courses. Students who wish to register for the second five-week session, the second session in Law, or any other session may register on the stated registration dates for those sessions or on any earlier summer registration date (see Summer

ssions Calendar, pages 5–6). Tuition for all courses is due and payable in ll at the time of registration.

Students expecting to complete requirements for degrees during the Summer essions must apply for graduation as a part of registration for the Summer essions and pay the appropriate fee.

In special instances, with the permission of the instructor, a person who has een admitted to the University may be registered as an auditor in a class with- ut being required to take active part or to pass examinations. No academic redit will be allowed for such attendance. A student who takes a course as an uditor may not repeat it for credit.

EGISTRATION BY GW STUDENTS FOR CONSORTIUM COURSES

tudents interested in taking courses at any of the other institutions in the onsortium of Universities of the Washington Metropolitan Area, Inc. (see age 9), should consult the program announcements of the other institutions. onsortium application forms and instructions are available from the Registrar fter the student has obtained his registration packet.

In order to participate in the Consortium program (1) the graduate student ust obtain the approval of his adviser and should ascertain from the depart- ent of the institution where the course is taught whether or not he is eligible r the course and whether there is space in the class, or (2) the undergraduate tudent must obtain the approval of his adviser and *must* ascertain from the epartment of the institution where the course is taught whether or not he is ligible for the course and whether there is space in the class. Specific in- uiries should be addressed to the Registrar.

HANGES IN PROGRAM OF STUDY

hanges in programs of study may be made only with the permission of the dviser or major professor and the dean or director of the college, school, or ivision concerned.

Students should consult the deans' offices concerning final dates on which hanges in schedule may be made.

Fees and Financial Regulations*

HE FOLLOWING FEES have been adopted for the summer of 1974:

uition Fees

or each semester hour for students in colleges, schools, and divisions other than in the School of Engineering and Applied Science†	$90.00
or each semester hour for students in the School of Engineering and Applied Science†	92.00

*For information on fees and financial regulations for law courses and programs, contact the ffice of the Dean, the National Law Center.

†Candidates for Master's degrees in the School of Engineering and Applied Science and candidates or doctoral degrees who were in residence in the University prior to the 1967 Summer Sessions ay complete their programs under the schedule for payment of tuition fees in effect prior to ly 1, 1967.

University Center Fee (charged all students registered on campus*, nonrefundable)

For each semester hour for which the student registers $4.00

Additional Course Fees

In certain courses additional fees, such as laboratory and material fees, are charged as indicated in the course descriptions. These fees are due with the tuition fee for the course. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the laboratory fee, the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Associate in Arts 10.00
Bachelor's, Master's, Education Specialist, and Doctor's degrees 25.00
Post-Master's Graduate Certificate in Health Care Administration 25.00

Fee for Binding Master's Thesis 10.00

Fee for Microfilm Service and Printing Announcement of Final Examination (Doctoral candidates) 60.00

Special Fees

Application fee (undergraduate degree candidate) nonrefundable 10.00
Application fee (graduate degree candidate) nonrefundable 25.00
Admission tests (when required) 6.00–12.00
Late-registration fee, for failure to register within the designated period 15.00
Late payment fee, charged for failure to make payments when due (see "Payment of Fees," below) 15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," below) 35.00
Returned check fee, charged a student whose check is returned because of insufficient funds or improper drafting 15.00
For each examination to qualify for advanced standing and for each special examination 5.00
Special Columbian College departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, *or both* 25.00
English test for foreign students (when required) 5.00
Laboratory check-out fee, for failure to check out of chemistry laboratory by the date set by the instructor† 3.00
National Teacher Examinations fee, for Bachelor of Arts in Education degree candidates 9.00–13.00
Transcript fee, for each transcript of record 2.00

Registration on campus in the University entitles each student to the following University privileges: (1) the services of the Student Career Services Office; (2) the use of the University Library; and (3) medical attention as described under "Student Health Service" (see page 22). These privileges terminate when the student withdraws or is dismissed from the University.

* The maximum charge for any student during the entire Summer Sessions will be $43.00. Students in the College of General Studies are charged the University Center Fee only when registered for courses on campus.

† A student who drops a Chemistry course before the end of the session must check out of the laboratory at the next laboratory period.

'AYMENT OF FEES

No student is permitted to complete registration or to attend classes until all fees are paid. Fees for each session are due in advance at the time of registration.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his rights to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

WITHDRAWALS AND REFUNDS

Withdrawal from a course or from the University requires the permission of the dean of the college, school, or division in which the student is registered. Application must be made in person or in writing. Notification to an instructor is not an acceptable notice: all charges for courses dropped without the approval of the dean must be met by the student.

Authorization to withdraw and certification for work done will not be given to a student who does not have a clear financial record.

In authorized withdrawals and changes in schedule, cancellation of tuition charges and course fees will be made in accordance with the following schedule:

Session	*Per cent refund on or before the date listed* 90%	75%	50%	None
t 5-week Session (June 3–July 10)	June 6	June 11	June 17	after June 17
week Courses (June 3–July 28)	June 7	June 12	June 18	after June 18
gineering 7-week Session une 3–July 22)	June 7	June 12	June 18	after June 18
d 5-week Session (July 11–Aug. 16)	July 16	July 19	July 25	after July 25
3-week Education Workshop ne 17–July 5)	June 18	June 20	June 24	after June 24
week Courses (June 17–July 26)	June 19	June 24	June 28	after June 28
week Courses (June 17–Aug. 16)	June 20	June 25	July 1	after July 1
d 3-week Education Workshop ly 8–July 26)	July 9	July 11	July 15	after July 15

Session	Per cent refund on or before the date listed 90%	75%	50%	None
3rd 3-week Education Workshop (July 29–Aug. 16)	July 30	Aug. 1	Aug. 5	after Aug. 5
Education 6-week Session (July 8–Aug. 16)	July 10	July 15	July 19	after July 19
Law 13-week Session (May 28–Aug. 24)	June 4	June 18	July 2	after July 2
Law 1st 6-week Session (May 28–July 10)	May 31	June 5	June 11	after June 11
Law 2nd 6-week Session (July 11–Aug. 24)	July 16	July 25	July 19	after July 25

In no case will tuition be reduced or refunded because of absence from classes.

Payment applies only to the session for which a registration charge is incurred and will not be credited to another session or term.

Students withdrawing from courses scheduled at times other than those included in the list on this and the preceding page should consult the Student Accounts Office for information concerning refunds.

University Regulations

STUDENTS IN THE SUMMER SESSIONS are subject to the same regulations governing students enrolled in a college, school, or division of the University during the academic year. Degree candidates are referred to the catalogues of the schools in which they are registered. Nondegree students should consult the *Undergraduate and Graduate Catalogue.*

Academic Credit.—The Summer Sessions are an integral part of the University. Academic credit for completed work will be given toward the appropriate degrees in the various colleges and schools of the University in accordance with their separate regulations and requirements.

Residence.—Summer Sessions work may be counted in residence but the candidate for a degree must satisfy the residence requirements of the school or college concerned.

Academic Work Load.—No full-time student may take more than 7 semester hours of work during each 5-week session. No student employed more than 20 hours a week may take more than 4 semester hours of work during each 5-week session.

In the School of Education, 3 semester hours constitutes a full-time program for full-time students in any one of the 3-week workshop sessions, and 6 semester hours represents full-time work in the 6-week session.

In the National Law Center the maximum amount of work that may be aken in each session by a full-time student is 6 semester hours; by an em-loyed student, 4 semester hours.

In the School of Engineering and Applied Science the maximum amount of work that may be taken in a session by a full-time student is 6 semester hours.

The right is reserved by the University to dismiss or exclude any student from he University, or from any class or classes, whenever, in the interest of the tudent or the University, the University Administration deems it advisable to do so.

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

The University and its various colleges, schools, and divisions reserve the ight to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

The University is not responsible for the loss of personal property in any niversity building. A "Lost and Found" office is maintained on campus in the Safety and Security Office, Woodhull House, 2033 G Street, N.W.

NIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

In general, the policy of the University is one of attempting to keep the stu-ent's record confidential and out of the hands of those who would use it for ther than legitimate reasons. At the same time, the policy must be flexible nough not to hinder the student, the University, or the community in their egitimate endeavors.

No information concerning a student will be released except as noted below:

1. Information such as whether or not the student is currently enrolled; ates of attendance; verification of date and place of birth; degrees earned (if any), date, major field or area of concentration, and honors received; home nd local addresses and telephone numbers; school, college, or division of nrollment, and class; verification of signature; name and address of parent or uardian.

2. The issuance of formal transcripts of record to recognized institutions of igher learning; the certification of academic achievement to the various recog-ized professional associations (law, medicine, engineering, education, etc.).

Additional information will be released only on written authorization from he student, or by court order or subpoena. If a subpoena is served, the stu-ent whose record is being subpoenaed will be notified and the subpoena will e referred to the University's legal counsel.

Government investigative agencies have no inherent right to access to stu-ent files and records. If expressly requested, properly identified representa-ives from federal, state, or local government agencies may be given the infor-ation listed under No. 1 above.

ECENTLY ESTABLISHED REGULATIONS

n Appendix (pages 123–25) contains regulations recently approved by the niversity's Board of Trustees.

Student Services and Activities

STUDENT HEALTH SERVICE

THE STUDENT HEALTH SERVICE is a general outpatient clinic designed to assist students registered on campus with their health needs. This Service is located at 935 22nd Street, N.W. (in the H.B. Burns Memorial Building).

Physicians are present during the summer sessions from 9 a.m. to 5 p.m. and from 6 p.m. to 9 p.m., Monday through Friday, and from 9 a.m. to 12 noon on Saturday. For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Any student may engage, if he so desires, physicians and nurses of his own choice, but he will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, X-ray work and referrals to specialists or other outside physicians) are the responsibility of the student. Within the Student Health Service, there will be only a few small charges for some services, such as materials for an allergy injection series, overseas immunizations, and certain other services.

The Student Health Service is available only to the student registered on campus and only during the session in which he is enrolled.

Any student who intends to train for an athletic team is required to pass a thorough medical examination. The University is not responsible for injuries received in intercollegiate or intramural games, or in any of the activities of the Department of Physical Education, Health, and Recreation.

THE READING CENTER

The Reading Center offers individual diagnostic and corrective services for all levels: primary, elementary, secondary, and adult. In addition, special reading improvement classes are conducted for high school and college students as well as other adults.

A complete diagnosis includes psychological tests; vision, hearing, dominance, and spelling tests; and various types of reading achievement and aptitude tests. Results are interpreted, and a written report is presented in conference with the parents or the individual.

The special reading improvement classes for high school students, college students, and other adults are offered throughout the year at stated intervals. Emphasis is placed on improvement of vocabulary, speed, comprehension, and study skills. Instruction in spelling is also provided as needed. Mechanical aids such as the tachistoscope, rate accelerator, and controlled reader are available for increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $90; for individual instruction, $10 a lesson; for semi-individual instruction, $7 a lesson; for instruction in small groups, secondary level, $6 a lesson. Reading classes (15 two-hour sessions) are offered for adults, $140; for full-time George Washington University students, $65. All fees are payable in advance at the Office of the Cashier.

COUNSELING CENTER

The Center offers to students enrolled in the University services which are designed to assist individuals in the diagnosis and treatment of their educational,

ersonal, and social problems; to diagnose problems leading to academic diffi-ulties; to offer vocational counseling and programmed instruction; and to refer ndividuals to qualified agencies for assistance with problems not handled by the enter. Behavior therapy, individual and group psychotherapy, and individual nd group counseling are available.

The Center also provides special assessments including diagnostic measures rescribed by the School of Engineering and Applied Science, admissions tests or the University and for other selected educational institutions, and some elected assessments for business and industry.

Fees.—Students who are currently registered as degree candidates in the Uni-ersity are entitled to one interview free of charge. If the student decides to ontinue to use the services offered, a minimum flat fee of $30 will be charged or short-term treatment. Fees for testing and long-term treatment depend upon he services involved. All fees are payable at the Counseling Center Office.

HE SPEECH AND HEARING CLINIC

The Speech and Hearing Clinic offers diagnostic and remedial work for children nd adults with such communication difficulties as stuttering, lisping, cleft palate peech, and cerebral-palsied speech; and with voice, articulatory, and hearing roblems. Diagnostic and remedial work is also available for persons with onstandard language usage due to such conditions as hearing loss, brain amage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $24. Fees for additional special-ed testing are dependent on the testing involved. The fees for individual peech or hearing therapy range from $3 to $12 a session. Fees are reduced or full-time students enrolled in the University and for persons receiving roup therapy. Fees are payable at the Office of the Cashier.

ETERANS EDUCATION

he Office of the Registrar assists students entitled to educational benefits as eterans or war orphans with any problems which may arise concerning their enefits. This Office also processes certification of enrollment and attendance the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or war orphans should nsult the Office of the Registrar prior to submitting application to the Vet-ans Administration. All such students should obtain the instruction sheet ued by the Office of the Registrar, which sets forth requirements to be ful-led before certification of enrollment can be made to the Veterans Adminis-tion, and which includes other information of general interest.

The Veterans Administration is at 2033 M Street, N.W., Washington, D.C. 421.

SIDENCE HALL

en, women, and married couples (no children) will be housed in Thurston sidence Hall, 1900 F Street, N.W. This is a modern, air-conditioned building. Admission to the University does not include a room reservation. A separate plication for a room should be made well in advance.

RESIDENCE HALL RATES FOR 1974 SUMMER SESSIONS*

	Multiple Occupancy	*Single Occupancy*
Monthly	$120.00	$160.00
Weekly	30.00	40.00
Daily	7.00	9.00
Each regular 5-week Session	150.00	200.00

Residence hall payments are due and payable in advance. A student who fails to meet payment is subject to automatic suspension.

Forms for application, together with detailed information, may be obtained from the Director of Housing.

Information concerning off-campus housing near the University is available at the Office of the Director of Housing.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

The Center Governing Board, representative of all elements of the University community, plays an important role in the day-to-day functioning of the Center. This Board works closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

The Student and Alumni Career Services Office provides assistance to degree-seeking students and alumni seeking full-time, part-time, temporary, or permanent employment. All students are urged to become acquainted with the services of this Office early in their college experience.

Counseling concerning trends in employment, areas of employment, various test and examination announcements, preparation for job interviews, résumé-writing, and other procedures for successful job application are always available. Specific career openings; an on-campus recruitment program by business, industry, government, and school systems; volunteer opportunities; and part-time and temporary jobs for students while attending school are all part of this service. Referral and placement functions of the on-campus College Work-Study Program are handled by the Student and Alumni Career Services Office. Teacher credential files initiated by persons seeking employment in all educational fields are maintained in this Office.

An understanding and knowledgeable approach to avenues of service for those people who do not find career satisfaction in the structured systems of business, government, and education is also provided in the Student and Alumni Career Services Office.

* The rates include linen service. Rates shown are subject to change.

SOCIAL AND RECREATIONAL PROGRAM

The social and recreational program includes many varied activities and scheduled events. In addition to this campus program a great abundance of cultural as well as social and recreational opportunities is available to persons living in the metropolitan area. During the summer the University posts a weekly guide of these events on a bulletin board in the Cloyd Heck Marvin Center.

THE COLLEGES, SCHOOLS, AND DIVISIONS

INFORMATION CONCERNING SPECIFIC REQUIREMENTS for degrees is omitted from this catalogue. For such information and other pertinent regulations, the student is referred to the catalogue of the school concerned.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

Since its founding in 1821, Columbian College has been the liberal arts unit of the University, offering baccalaureate degrees in all the traditional areas of the arts and sciences. Under a new academic plan, students have wide options in developing their academic programs, in earning advanced standing by examination, in devising interdepartmental majors, and, if qualified, in working toward a new three-year program leading to the regular degrees. Students are encouraged to select their major field as soon as possible, hopefully no later than the end of their freshman year. From that time, they receive their academic advice and guidance from the chosen major-field department. In addition to fulfilling major-field requirements, students are expected to broaden their cultural foundations in the Humanities, the Social Studies, and the Natural and the Mathematical Sciences. The College also provides prelegal and premedical programs and also the preprofessional work required for admission to the School of Education and to the School of Public and International Affairs.

THE DEGREES

Columbian College offers work leading to the following degrees: Associate in Arts, Bachelor of Arts, and Bachelor of Science. In cooperation with the School of Medicine and Health Sciences, Columbian College offers work leading to the combined degrees of Bachelor of Arts and Doctor of Medicine. Columbian College grants the following degrees to students in off-campus programs administered by the College of General Studies: Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Geodetic and Cartographic Science, and Bachelor of Science in Oceanography.

ENTRANCE REQUIREMENTS

Requirements for admission to the freshman class are as follows:

1. An acceptable certificate of graduation from an accredited secondary school, showing at least fifteen units which must include four years of English;

t least two years of one foreign language; two years of science, preferably with boratory instruction; two years of social studies, one of which must be Amer- an history; and two years of college preparatory mathematics. It is to be noted at one unit of algebra, or the equivalent, is prerequisite to courses in chemis- and statistics, and that one unit in algebra and one unit in plane geometry, the equivalent, are prerequisite to courses in mathematics and physics.

2. The principal's statement that the applicant is prepared to undertake col- ge work.

3. College Entrance Examination Board scores, which must be submitted on e Scholastic Aptitude Test and the English Composition Achievement Test.*

A person who does not present all of the formal requirements stated above ay request the Office of Admissions to present his case to the Columbian Col- ge Committee on Admission and Advanced Standing. The Committee may escribe appropriate tests.

The applicant is responsible for

Sending the report form obtained from the Office of Admissions to his high school principal who will complete the form and forward it directly to the Office of Admissions.

Requesting a report of scores on the Scholastic Aptitude Test and the Eng- lish Composition Achievement Test to be sent to the Office of Admissions by the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540, or 1947 Center Street, Berkeley, Calif. 94704.

AJOR FIELDS

urricula leading to the degree of Bachelor of Arts are available in the follow- g major fields:

merican Civilization
merican Literature
nthropology
pplied Mathematics
pplied Statistics
History
ology
iany
emistry
inese Language and Literature
assical Archaeology and
Anthropology, studies in
assical Archaeology and Classics,
tudies in
assical Humanities
matic Art
nomics
lish Literature
ironmental Studies
Arts
ch Language and Literature
graphy
ology
manic Languages and Literatures
ory
Journalism
Judaic Studies
Latin
Latin American Studies
Mathematical Statistics
Mathematics
Music:
  Applied Music
  Music History and Literature
  Music Theory
Philosophy
Physics
Political Science
Psychology
Religion
Russian Language and Literature
Russian Literature and Culture—in Translation
Sociology
Spanish American Literature
Spanish Language and Literature
Speech Communication
Speech Pathology and Audiology
Zoology

Page 16 for American College Testing Program.

Curricula leading to the degree of Bachelor of Science are available in the following major fields:

Applied Mathematics
Applied Statistics
Biology
Botany
Chemistry
Environmental Studies
Geology
Mathematical Statistics
Mathematics
Physics
Zoology

THE GRADUATE SCHOOL OF ARTS AND SCIENCES

The Graduate School offers work leading to the following degrees: Master of Arts, Master of Arts in Special Studies, Master of Fine Arts, Master of Forensic Sciences, Master of Music, Master of Science, Master of Science for Teachers, Master of Science in Forensic Science, Master of Science in Special Studies, and Doctor of Philosophy. In cooperation with the School of Medicine and Health Sciences, the Graduate School offers work leading to the combined degrees of Master of Science and Doctor of Medicine or Doctor of Philosophy and Doctor of Medicine. The degrees of Master of Arts in Special Studies and Master of Science in Special Studies, which are also available in off-campus programs, are designed for students who do not wish to concentrate in a specific field such as those listed below under "Graduate Fields," but instead are interested in interdisciplinary programs. It is possible to group several of these fields together to make an interdisciplinary program; the program of studies is determined by the student in consultation with the Dean of the Graduate School. Courses in off-campus programs leading to these degrees are administered by the College of General Studies.

ENTRANCE REQUIREMENTS

The entering graduate student must have an approved Bachelor's degree from an accredited higher institution, an appropriate distribution of courses, and a superior quality of work in the major field. Entering graduate students working toward the degree of Master of Science for Teachers must also have experience in teaching mathematics at the secondary school level.

GRADUATE FIELDS

Subject	Degrees Offered	
I. Humanities		
American Civilization	M.A.	Ph.D.
American Literature	M.A.	Ph.D.
Art:	M.F.A.	
Ceramics		
Design		
Graphics		
Painting		
Photography		
Sculpture		
Art History	M.A.	

Subject	Degrees Offered	
Art Therapy	M.A.	
Classical Archaeology, Classics, and History	M.A.	
Dramatic Art	M.F.A.	
English Literature	M.A.	Ph.D.
*French Literature	M.A.	Ph.D.
Germanic Languages and Literatures	M.A.	
Music:	Mus.M.	
Applied Music		
Conducting		
Music Composition		
Music Theory		
Musicology	M.A.	
Philosophy	M.A.	
Religion	M.A.	
Religion and Medical Care	M.A.	
Religious Education	M.A.	
Russian Language and Literature	M.A.	
*Spanish American Literature	M.A.	Ph.D.
*Spanish Literature	M.A.	Ph.D.
II. Social Sciences		
Anthropology	M.A.	
Economics	M.A.	Ph.D.
Education Policy		Ph.D.
Forensic Science	M.Forens.S.	
Geography	M.A.	
History	M.A.	Ph.D.
†International Relations		Ph.D.
Political Science	M.A.	Ph.D.
Sociology	M.A.	Ph.D.
III. Physical and Mathematical Sciences		
Applied Mathematics	M.A., M.S.	
Applied Statistics	M.S.	
Chemistry	M.S.	Ph.D.
Forensic Science	M.S. in Forens.S.	
Geochemistry	M.S.	Ph.D.
Geology	M.A., M.S.	Ph.D.
Mathematical Statistics	M.A.	Ph.D.
Mathematics	M.A.	Ph.D.
Physics	M.A.	Ph.D.
V. Biomedical and Related Sciences		
Anatomical Pathology	M.S.	
Anatomy		Ph.D.
Biochemistry	M.S.	Ph.D.

*Any approved combination of French, Spanish, or Spanish American Literature is available as a ctor of Philosophy field.
†The School of Public and International Affairs offers a Master of Arts field in International ions.

Subject	Degrees Offered
*Biological Sciences	M.S. Ph.D
Genetics	M.S. Ph.D
Human Ecology	Ph.D
Microbiology	M.S. Ph.D
Mycology	M.S.
Pathology	Ph.D
Pharmacology	M.S. Ph.D
Physiology	M.S. Ph.D
Psychology	MA. Ph.D
Speech Pathology and Audiology	M.A.

THE NATIONAL LAW CENTER

The National Law Center offers work leading to the degrees of Juris Doctor, Master of Laws, Master of Comparative Law, Master of Comparative Law (American Practice), and Doctor of Juridical Science.

Forms for application for admission and information concerning course offerings may be obtained from the Office of the Dean of the National Law Center, 720 Twentieth Street, N.W., Washington, D.C. 20006.

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

The School of Engineering and Applied Science offers courses leading to the degree of Bachelor of Science in the following areas: Civil Engineering (with Computer-oriented Civil Engineering and Environmental Civil Engineering options), Electrical Engineering (with Computer Science option), and Mechanical Engineering (with Computer-oriented Mechanical Engineering option). Graduate programs lead to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. The School also grants the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science to students in off-campus programs administered by the College of General Studies.

ENTRANCE REQUIREMENTS FOR THE BACHELOR OF SCIENCE DEGREE

The School admits those applicants who can benefit themselves and society by disciplined intellectual effort in its environment.

Admission is the first selective step in a long series of qualifying steps the student will take in his progress toward professional competence in engineering. It indicates the School's belief that the applicant has at least the minimum preparation and ability to complete the curriculum successfully.

The applicant must be of good character and must have an academic background appropriate for the program of studies contemplated.

Consideration for admission is based on the following:

1. An acceptable certificate of graduation from an accredited high school showing at least fifteen units†;

* Biology, Botany, and Zoology.

† A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods of prepared classroom work.

2. The principal's statement that the applicant is prepared to undertake college work;

3. Scores on the following College Entrance Examination Board tests: the Scholastic Aptitude Test, the English Composition Achievement Test, and a Level I (Standard) or Level II (Intensive) Mathematics Test—Level I preferred.

The qualifications of applicants who, because of unusual circumstances, do not meet the above requirements will be considered by the School, which may prescribe admission tests.

Nine and one-half of the fifteen units required for entrance must be distributed as follows: three in English, two in algebra, one in plane geometry, one-half in plane trigonometry, one in physics or chemistry, and two in one foreign language or history. General science may not be counted in satisfaction of the science requirement but may be counted as an elective unit.

It is recommended that *both* physics and chemistry be studied in high school. A high school course in solid geometry is recommended as a firm foundation for college mathematics.

An applicant must arrange to have sent directly *from his school to the Office of Admissions of the University* the academic record of his first seven terms in secondary school, together with a personal evaluation and recommendation from his principal. This information may be supplied on a form provided by the University or on a standard form used by the secondary school provided the essential information is included.

Quantitative Deficiency.—A graduate of an approved high school who lacks not more than two units of the required subjects and who presents fifteen acceptable units may be admitted to a prescribed program which includes courses to make up his deficiencies.

ENTRANCE REQUIREMENTS FOR THE MASTER'S DEGREES

Admission to graduate study toward a Master's degree requires an appropriate Bachelor's degree from a recognized institution and evidence of capacity for productive work in the field selected, as indicated by undergraduate grades, Graduate Record Examination scores, and similar data.

An applicant who has significant deficiencies in preparation may be required to take prescribed undergraduate courses as an unclassified student before being admitted to graduate student status. In some cases, if such deficiencies are minimal, he may be admitted to graduate student status and allowed to take a limited number of graduate courses while completing the undergraduate courses in which he is deficient. In no case may the undergraduate courses thus taken fulfill any part of the requirements for the Master's degree.

ENTRANCE REQUIREMENTS FOR THE DOCTOR'S DEGREE

A satisfactory Master's degree from an accredited institution is required, together with acceptable personal qualities and a capacity for creative scholarship. Normally, a *B* average in graduate work is required. However, the minimum does not assure automatic acceptance; the departments may, and often do, require higher admission standards. The prospective doctoral student seeking admission should apply before June 1 for the fall semester and before December 1 for the spring semester. Personal interviews may then be arranged to discuss the applicant's qualifications and the possibilities for an effective doctoral program. The applicant must arrange for complete documentary records (tran-

scripts) to be forwarded to the Engineering Admissions Office in sufficient time to permit assembly of complete records for evaluation as soon after the above application deadlines as possible.

The applicant must arrange for letters of recommendation to be submitted from two faculty members of the institution from which he received his Master's degree; one of these, if possible, should be from his Master's adviser. The letters should be addressed to the appropriate department chairman.

THE SCHOOL OF EDUCATION

The School of Education offers initial preparation in teaching, counseling, supervision, and administration as well as opportunities for experienced educators to extend their training. The schedule of courses is arranged to meet the needs of employed students as well as those able to devote full time to their studies. Students pursuing programs involving teacher certification must make arrangements to student-teach in the fall or spring semester during hours when public schools are in session. The School offers both graduate and undergraduate work.

THE DEGREES

The School of Education offers work leading to the following degrees: Bachelor of Arts in Education, Bachelor of Science in Physical Education, Master of Arts in Teaching, Master of Arts in Education, Education Specialist, and Doctor of Education. The School also grants the degree of Master of Arts in Education to students in the off-campus programs administered by the College of General Studies.

ENTRANCE REQUIREMENTS

For the Bachelor's Degrees.—The satisfactory completion of two years of approved college work, or graduation from an approved two-year college, or the equivalent, is required.

For the degree of Master of Arts in Education.—A Bachelor's degree from an accredited institution, an undergraduate quality-point index of 2.50 or above ($C+$ average), demonstrated interest in teaching, and personality traits that give promise of success as a teacher, are required. Two years of successful teaching are required before admission to candidacy in the fields of guidance and school administration. Experience is required for admission to programs in adult education and human resource development.

For the Degree of Master of Arts in Teaching.—To be admitted as a student-intern in the elementary education program, an applicant must (1) have a Bachelor's degree from an accredited liberal arts institution, including courses related to the general education requirements for teacher certification; (2) show evidence of interest in children and a sincere desire to teach; (3) submit three written references attesting to quality of academic record and personality; (4) submit a score on the Aptitude Test of the Graduate Record Examination or the Miller Analogies Test; and (5) be interviewed by the University Selection Committee, or under arrangements specified by the Committee and approved by the Dean of the School of Education. To be admitted to the program in museum education, an applicant must (1) have a Bachelor's degree

from an accredited liberal arts institution; (2) submit three written references attesting to quality of academic record and work experience; and (3) be interviewed by the University Selection Committee, or under arrangements specified by the Committee and approved by the Dean of the School of Education. For the program in museum education, skills in communication, a desire to study and learn from the artifacts of nature and civilization, and an ability for and interest in working with people are essential; evidence of strong undergraduate, graduate, or professional experience in such fields as American history, geology, art, or the social sciences will be considered favorably.

For the Degree of Education Specialist.—The degree of Master of Arts in Education from this University, or the equivalent; a satisfactory score on the Miller Analogies Test or the Graduate Record Examination; and two years of successful pertinent experience are required. Each applicant must be interviewed and recommended by a staff member of the School of Education or by a representative in the candidate's locality appointed by the Dean.

For the Degree of Doctor of Education.—The applicant must have adequate preparation for advanced study, including graduate work in fields prerequisite to his objective equivalent to that required for the degree of Master of Arts in Education at this University, at least three years of successful pertinent educational experience, acceptable personal qualities, and capacity for creative scholarship and effective leadership.

THE SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION

The School of Government and Business Administration offers work leading to the following degrees: (1) Bachelor of Business Administration with a major in Accounting or Business Administration; (2) Master of Arts in Government in the fields of Personnel Management, Public Administration, or Urban and Regional Planning; (3) Master of Arts in Health Care Administration; (4) Master of Business Administration with fields of concentration in Accounting, Behavioral Sciences in Organization Development, Business-Government Relations, Finance and Investments, Health Care Administration, Information Technology, International Business, Managerial Economics, Management of Science and Technology, Marketing, Operations Research and Systems Analysis, Personnel Management, Procurement and Contracting, or Transportation; (5) Master of Public Administration in the fields of Health Care Administration, Personnel Management, Public Administration, or Urban and Regional Planning; (6) Master of Urban and Regional Planning; (7) Post-Master's Graduate Certificate in Health Care Administration; (8) Doctor of Business Administration; and (9) Doctor of Public Administration. The School also grants the degrees of Bachelor of Science in Administration and Master of Science in Administration to students in off-campus programs administered by the College of General Studies.

ENTRANCE REQUIREMENTS FOR THE BACHELOR'S DEGREE

Requirements for admission to the freshman class are as follows:

1. An acceptable certificate of graduation from an accredited secondary school, showing at least fifteen units which must include four years of English;

at least two years of one foreign language; two years of science, preferably with laboratory instruction; two years of social studies, one of which must be American history; and two years of college preparatory mathematics. It is to be noted that one unit of algebra, or the equivalent, is prerequisite to courses in chemistry and statistics, and that one unit in algebra and one unit in plane geometry, or the equivalent, are prerequisite to courses in mathematics and physics.

2. The principal's statement that the applicant is prepared to undertake college work.

3. College Entrance Examination Board scores, which must be submitted on the Scholastic Aptitude Test and the English Composition Achievement Test.*

A person who does not present all of the formal requirements stated above may request the Office of Admissions to present his case to the School of Government and Business Administration. The School may prescribe appropriate tests.

The applicant is responsible for

a. Sending the report form obtained from the Office of Admissions to his high school principal who will complete the form and forward it directly to the Office of Admissions.
b. Requesting a report of scores on the Scholastic Aptitude Test and the English Composition Achievement Test to be sent to the Office of Admissions by the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540, or 1947 Center Street, Berkeley, Calif. 94704.

ENTRANCE REQUIREMENTS FOR THE MASTER'S DEGREES

A Bachelor's degree from an accredited college or university, which includes at least 90 semester hours of academic work with a quality-point index of 3.00 (*B* average) in the relevant undergraduate field, is required.

Applicants for admission to all Master's degree programs are required to take either the Admission Test for Graduate Study in Business or the aptitude sections of the Graduate Record Examination, both of which are administered by the Educational Testing Service. Master of Business Administration applicants must submit scores on the Admission Test for Graduate Study in Business; Master of Arts in Government, Master of Arts in Health Care Administration, Master of Public Administration, or Master of Urban and Regional Planning applicants may submit scores on either the Admission Test for Graduate Study in Business or the Graduate Record Examination. Any test scores submitted must have been recorded within three years of the date of application.

ENTRANCE REQUIREMENTS FOR THE DOCTOR'S DEGREES

Doctor of Business Administration.—The degree of Master of Business Administration, Master of Arts in an approved field, or the equivalent, together with acceptable personal qualities and a capacity for creative scholarship, is required. Applicants must file results of the Admission Test for Graduate Study in Business administered by the Educational Testing Service.

Doctor of Public Administration.—The degree of Master of Public Administration, Master of Arts in an approved field, or the equivalent, together with

* See page 16 for American College Testing Program.

ceptable personal qualities and a capacity for creative scholarship, is required. pplicants must file results on either the Admission Test for Graduate Study in siness *or* the aptitude sections of the Graduate Record Examination admin-ered by the Educational Testing Service.

THE SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS

he School of Public and International Affairs offers work leading to the de-rees of Bachelor of Arts with a major in Chinese Language and Literature, hinese Studies, International Affairs, Public Affairs, or Urban Affairs; Master Arts in the fields of International Affairs, Latin American Studies, Public ffairs, Russian Studies, and Science, Technology, and Public Policy.

NTRANCE REQUIREMENTS FOR THE BACHELOR OF ARTS DEGREE

With a major in Chinese Language and Literature, Chinese Studies, Interna-onal Affairs, Public Affairs, or Urban Affairs.—The satisfactory completion the appropriate curriculum for the freshman and sophomore years in Co-mbian College of Arts and Sciences, or the equivalent, is required.

NTRANCE REQUIREMENTS FOR THE MASTER OF ARTS DEGREE

Bachelor's degree from an accredited college or university is required. Stu-nts admitted to candidacy should have attained a *B* average or equivalent in e relevant undergraduate fields.

In the field of International Affairs.—The applicant's undergraduate program ould include background courses corresponding to an undergraduate major international affairs at this University.

In the field of Latin American Studies.—An undergraduate major in Latin merican Studies is normally required. Majors in other fields may be con-dered provided their undergraduate course work includes Spanish or Portu-ese and sufficient course work in three of the following areas: Anthropology, onomics, Geography and Regional Science, Hispanic Literature, History, and litical Science.

In the field of Public Affairs.—An undergraduate major in public affairs, nomics, history, or political science, depending on the field of specialization, equired.

In the field of Russian Studies.—The applicant's undergraduate program uld include appropriate background courses in history, political science, and sian language.

In the field of Science, Technology, and Public Policy.—No particular dergraduate concentration is required. The desirable qualifications are both erior competence in a specific discipline and potential aptitude for cross-ciplinary work.

THE COLLEGE OF GENERAL STUDIES

College of General Studies administers the off-campus degree programs which Columbian College of Arts and Sciences, the Graduate School of and Sciences, the School of Engineering and Applied Science, the School Education, and the School of Government and Business Administration have

degree-granting authority. The College also offers credit courses in liberal arts, education, and business administration for which there is sufficient demand. Special programs are offered to meet the in-service needs of specified groups. As a community service, a regular program of noncredit courses without entrance requirements is also offered.

ENTRANCE REQUIREMENTS

Off-campus Credit Courses.—A simplified procedure is used for admission and registration in off-campus courses. Transcripts of previous academic work are not required. Registration is restricted to those whose qualifications would indicate that they are able to carry the course successfully. Registration in an off-campus course does not constitute admission to degree candidacy in the University.

Noncredit Courses.—In general, noncredit courses will be open to any individual interested in enrolling. When a noncredit course is organized at the request of some particular agency or group, admission may be restricted to the students recommended by the sponsoring organization. A limit on the size of classes may have to be imposed in order to maintain the quality of instruction.

The separate catalogue of the College of General Studies, available at the College, 706 Twentieth Street, N.W., Washington, D.C. 20006, contains full information concerning programs, courses, entrance and degree requirements, and fees.

THE DIVISION OF UNIVERSITY STUDENTS

The Division of University Students makes the work of the University, in its several colleges and schools, accessible to five types of students who are not working toward a degree in this University (see page 15).

THE DIVISION OF EXPERIMENTAL PROGRAMS

Under the auspices of the Division of Experimental Programs, students, faculty, and administrators throughout the University are involved in the planning, teaching, and evaluating of experimental courses and programs. There are presently two academic programs directly sponsored by the Division, the Program in Experimental Humanities and the Service-Learning Program.

The Program in Experimental Humanities offers courses which provide opportunities for students to combine sustained field-study with classroom work. These courses are taught by interdisciplinary and interdivisional faculty teams.

The Service-Learning Program integrates supervised work-study with classroom seminars. Students in the Program are assigned to community groups, research organizations, or governmental agencies.

The Division of Experimental Programs sponsors a special program in curricular development, the GW-Washington Project, which is charged with mobilizing academic resources throughout the University that can appropriately address the needs in the Washington, D.C., communities, particularly the communities of poverty.

SPECIAL PROGRAMS AND WORKSHOPS

HE SUMMER SESSIONS is pleased to announce a carefully planned group of spe-al programs and workshops devised to serve a variety of student needs and utilize resources which are uniquely present at the University and in the tion's capital. These programs, which are described below, have been devel-ped in many areas. They all have a strong academic orientation and will be ught by the regular faculty of the University or distinguished visitors from her institutions.

The American Cinema since 1950

RST SESSION—JUNE 3 TO JULY 10

M AS AN INDISPENSABLE DOCUMENTATION of the twentieth century and an portant art form is the subject of a special program to be offered jointly by American Studies Program and the Department of Speech and Drama. th aspects are explored in the context of the social and intellectual history of period 1950–1970. These questions are given principal consideration: What the techniques of visual communication? What are the relationships be-en production, distribution, consumption, criticism, and social control of ? How do films reflect and create values, attitudes, and opinions?

he class meets two evenings a week on the University campus, and each sday evening participants attend a film of the Rediscovery III series at the erican Film Institute Theatre of nearby John F. Kennedy Center for the forming Arts. Students are required to purchase in advance tickets for the Tuesday evening films at $2 each. Payment of $12 should be sent directly he AFI, John F. Kennedy Center, Washington, D.C. 20566, specifying s of June 4, 11, 18, 25; July 2, 9. (If they wish, students may subscribe to full 13-week Rediscovery III series, which begins May 28, for $15.)

dditional information may be obtained by writing Bernard Mergen, Direc-American Studies Program, George Washington University, Washington, 20006.

RICAN CIVILIZATION OR SPEECH AND DRAMA

192A **The American Cinema** (3) **Mergen**

T 6:30–9 pm, WTh 6:10–8 pm.

American Folklore Seminar

A THREE-WEEK COURSE—JUNE 10–29

THIS INTENSIVE THREE-WEEK SEMINAR AND WORKSHOP covers the various aspects of traditional cultures in the United States. Though the primary emphasis is on the mainstreams of traditional cultures (Anglo- and Afro-American), it also deals with American Indians, Pennsylvania Germans, and other ethnic groups. Folklore topics, presented from both historical and contemporary points of view, include narrative, song, music, dance, religion, games, proverbs, riddles; folk art, architecture, and craft; library and field methodology in folklore research; folk museums and archives; and the revival and/or preservation of crafts.

This course is sponsored jointly by the University and the National Folk Festival Association and is taught on the rural campus of Madeira School, near historic Wolf Trap Farm Park. Room and board are available at the School. The course is taught by Charles L. Perdue, Jr., Assistant Professor of Folklore at the University of Virginia; and distinguished guest lecturers from the Smithsonian Institution, the Library of Congress, and regional universities and museums are frequent visitors. Students gain some familiarity with the current manifestations of traditional cultures in this country—both through discussion and participation—and receive theoretical guidance and practical experience in applied folklore.

Application forms and additional information are available from the director of the seminar, Victor K. Golla, Assistant Professor of Anthropology, George Washington University, Washington, D.C. 20006.

ANTHROPOLOGY

254A **Seminar: Folklore in America** (6) Perdue and Staff

Intensive seminar covering the various aspects of American traditional culture, including the theory and methodology of folklore research. Primary emphasis on Anglo- and Afro-American traditional cultures with some consideration of other ethnic groups. MTWThF 9 am–4 pm.

Art and Archaeology Program in Italy

AUGUST 1 TO AUGUST 31

THE DEPARTMENT OF ART, in cooperation with the Etruscan Foundation and the College of General Studies, is offering a four-and-one-half-week study of Etruscan civilization at the Villa Spannochia, a private estate in central Italy, near the art centers of Siena and Florence. Professor William A. MacDonald will direct the program, and Italian lecturers will include Professor Dante Piccini and Professor Enzo Mazzeschi, who is Honorary Superintendent of Antiquities, Department of Siena.

Students enrolling in the program will live at the Villa Spannochia, which serves as headquarters for the Etruscan Foundation. Weekday mornings will

e occupied by excavation of Etruscan tombs in the vicinity of Siena. After-oons will be devoted to lectures on Etruscan art, archaeology, history, excava-on techniques, conservation and restoration. Students will participate in con-ervation, restoration, and cataloguing of archaelogical materials.

Students may register at the College of General Studies. Art 155 is an un-dergraduate course. Students who wish to receive graduate credit for this pro-gram will register for Art 242 and will be required to submit a written paper. Additional information, including cost of travel and tuition, may be obtained rom William A. MacDonald, Professor of Art and Archaeology, Building H, Room 100, George Washington University, Washington, D.C. 20006.

RT

155 **Etruscan Art and Archaeology** (6)

242 **Etruscan Art and Archaeology** (6)

Capital City Historical Seminar

ST SESSION—JUNE 3 TO JULY 10

IS SEMINAR ON THE HISTORY OF THE NATIONAL CAPITAL, offered jointly by American Studies Program and the Department of History, stresses the l nature of the city as home for people and seat of the Federal Government. overs the origin and physical growth of the city, its demographic features, the development of its institutions—economic, religious, educational, cul-l, and recreational. Some attention is given to the historic role of the press the treatment of Washington in popular literature.

etitia Woods Brown, Associate Professor of American History and Civiliza-, conducts the seminar, assisted by guest lecturers who contribute their ex-ise on special topics. Some discussions emphasize resources for the study ocal history and opportunities for research on the Federal Government. phasis throughout centers on experiencing the city as well as reading about Walking tours, bus rides, use of audio-visual materials—and guidance in lopment of such materials—are features of the course.

dditional information may be obtained from Assistant Professor Bernard Mergen, Director of the American Studies Program, or Professor R.W. ny, Chairman, Department of History, George Washington University, hington, D.C. 20006.

RICAN CIVILIZATION OR HISTORY

25A **History of Washington, D. C.** (3) Brown and Staff
TTh 6:10–8 pm; field trips as arranged.

Dance Workshop

JUNE 3 TO JUNE 21*

THE PROGRAMS IN DANCE of the Department of Physical Education, Health, and Recreation are offering a three-week dance workshop under the direction of Sharon Leigh Clark, Associate Professor of Physical Education. This year the Summer Dance Workshop will bring two well-known performers to the campus as Guest Artists-in-Residence, Elizabeth Keen, Dance, and Cheryl Gates McFadden, Mime Movement Theatre. A concert featuring works of students in repertory classes and the Guest Artists-in-Residence will be presented in the Marvin Theatre, Thursday, June 20, at 8:30 p.m.

The Workshop is open to both graduate and undergraduate students with previous experience in dance and theatre. From 1 to 4 semester hours of credit may be earned, or courses may be audited. Graduate credit in the program may be arranged.

Additional information may be obtained from Sharon Leigh Clark, Coordinator, Dance Programs, Building J, George Washington University, Washington, D.C. 20006.

PHYSICAL EDUCATION, HEALTH, AND RECREATION

116A **Mime Movement Theatre** (1) — McFadden
(Formerly Movement for Actors)
Psychological improvisation, improvisation with masks, Commedia dell' Arte, Pantomime Blanche, chorus work, clown work. MTWThF 11:30 am–1 pm.

118A **Special Problems in Dance Composition** (1) — Keen
Work with elements of movement leading to short composition studies. MTWThF 11:30 am–1 pm.

120A–1 **Repertory** (1 or 2) — Keen
Creation of a new work to be performed in concert at the end of the Workshop. Admission by permission of instructor. May be repeated for credit not to exceed 4 semester hours. MTWThF 2–3:30 pm.

120A–2 **Repertory** (1 or 2) — McFadden
Development of works based on techniques of mime movement theatre to be presented as works in progress at the end of the Workshop. May be repeated for credit not to exceed 4 semester hours. MTWThF 2–3:30 pm.

121A **Dance Technique I** (1) — Keen
Intermediate/advanced modern dance technique. May be repeated once for credit. MTWThF 9:30–11 am.

124A **Movement Technique** (1) — McFadden
Analysis of movement, dramatic justifications of movement; mime technique; respiration and its integration with movement. MTWThF 9:30–11 am.

* Classes begin June 3. Registration June 3, Building K.

Data Analysis for Educational Policy Decisions

IRST SESSION—JUNE 3 TO JULY 10

HE DEPARTMENT OF STATISTICS is offering a new course planned especially for ersons involved in educational policy-making. It emphasizes the framing of uestions of importance in educational policy and the use of existing data bases answer these questions. Various methods of analysis are used to examine ch data bases as the Coleman Study, the Mayeske reanalysis of the Coleman ata, Project Talent, National Assessment, and selected census information. ata analysis is performed using the GWU Computer Center. Although anned as a graduate-level course, qualified undergraduate students may be dmitted by permission of the instructor.

Additional information may be obtained by writing or telephoning Professor rthur D. Kirsch, Department of Statistics, George Washington University, ashington, D.C. 20006. Telephone: (202) 676-6889.

ATISTICS

205A **Data Analysis for Educational Policy Decisions** (3) Kirsch

The framing of questions of importance in educational policy and the use of existing data bases to answer these questions. Prerequisite: An introductory course in statistics. Laboratory fee, $20. Lecture MW 6:10–8:30 pm; laboratory as arranged.

Environmental Issues Program

NE 17 TO JULY 19

IVE-WEEK PROGRAM IN ENVIRONMENTAL STUDIES, treating in depth the prob- of water pollution, is offered by the Department of Biological Sciences for chers in secondary schools. The summer program, which consists of a 4- k institute followed by a one-week workshop, carries over into the follow- academic year, when participants, maintaining communication with the ctor, will be expected to develop a course package or module for their own ool curriculum. This aspect of the program is expected to provide a much- ded model for a national program in environmental studies at the pre-college l. A textbook for use at the secondary level will also be developed by the ctor and his staff from the materials presented in connection with the sum- program.

omplete applications must be submitted by March 15. For information and lication forms, write to Assistant Professor Terry L. Hufford, Department iological Sciences, George Washington University, Washington, D.C. 20006.

OGICAL SCIENCES

230A **Understanding Environmental Issues—Water Pollution** (6) Hufford and Staff

Methods and techniques used in determining water quality; engineering and technological skills currently utilized or available for use in dealing

with a variety of water quality aspects; attitudes and approaches of the social scientists; practical aspects of implementing water-quality programs. Preparation of secondary-school curricula. June 17–July 12: MTWThF 9–11 am and 1:30–3:30 pm; Saturday field trips as arranged. July 15–19: workshop as arranged.

Field Program in Pre-Columbian Cultural Ecology

JUNE 3 TO JUNE 30

THE DEPARTMENTS OF ANTHROPOLOGY AND GEOGRAPHY AND REGIONAL SCIENCE at George Washington University are offering an intensive four-week field program in Mexico for the study of Pre-Columbian cultural ecology. The diversity of irrigation system types found in ancient Mesoamerica suggests alternatives to the traditional hypothesis that large-scale canal irrigation is a prerequisite to settled urban life and a state-type political system. The class surveys Pre-Columbian settlement patterns and socio-political structure and their relationships to these agricultural water control systems. Students examine the evidence in the classroom, in the field, and on the sites themselves, and are encouraged to use a systems approach to develop alternative explanations for social integration. Mesoamerican systems are compared with those of the ancient Near East and Europe to aid in understanding the growth and development of contemporary urban centers and their relationships to the environment.

Students are introduced to the techniques of analysis used by scientists to perceive the complex interactions between cultural and environmental systems both in the laboratory and the field. Evenings are devoted to a survey of Mesoamerican prehistory and archaeology and seminar discussions of problems in human geography.

In addition to an extended period in the field examining pre- and post-contact irrigation systems of the Puebla-Tehuacan area, the class visits the Museum of Anthropology in Mexico City and the ancient cities of Teotihuacan, Tula, Cholula, and Monte Alban to view first-hand the widely variant systems of water control and the settlement patterns related to them in each area. Students live in selected hotel accommodations adjacent to the sites.

The course is directed by Robert L. Humphrey, Jr., Associate Professor of Anthropology, and Kenneth J. Langran, Assistant Professor of Geography and Regional Science. Further information, including cost of travel and tuition, and application forms may be obtained by writing to Robert L. Humphrey, Chairman, Department of Anthropology, or Kenneth J. Langran, Department of Geography and Regional Science, George Washington University, Washington, D.C. 20006.

ANTHROPOLOGY OR GEOGRAPHY AND REGIONAL SCIENCE

215A **Field Methods in Cultural Ecology: Pre-Columbian Settlement Patterns in the Tehuacan Valley** (6) — Humphrey, Langran

Field Research in Historical Archaeology

UNE 17 TO AUGUST 23

EORGE WASHINGTON UNIVERSITY'S Department of Anthropology and Amerian Studies Program, in cooperation with the Smithsonian Institution and the t. Mary's City Commission, a new historical agency of the State of Maryland, fer basic instruction and field training in historical archaeology. In an intenve ten-week program students will excavate an early Colonial plantation at t. Mary's, a Yeocomico Indian village which became the 17th century capital f Maryland. Today the site is occupied by the campus of St. Mary's College f Maryland and a state historic park. The summer program is designed to equaint young scholars with historical archaeology while recovering informaon needed for the development of the historic site.

Participants receive practical field experience in digging, record keeping, rawing, photographing, and surveying. Afternoon classes include instruction n making site maps, using a dark room, and identifying artifacts. In rotation, udents work in the laboratory and assist in directing the excavation. Weekly eminars, led by staff members and visiting scholars, explore the broader imlications of archaeology for the study of history and archaeology.

The program will be taught by the archaeological staff of the St. Mary's City ommission under the direction of Garry W. Stone. The Commission's affiliaon with the Smithsonian Institution and George Washington University will ring to the program specialists in history, anthropology, and archaeology, inluding from the Smithsonian Wilcomb E. Washburn, Harold Skramstad, J. fferson Miller II, and Melvin H. Jackson; from George Washington Univerty Robert L. Humphrey, Jr., and Bernard Mergen; and from the National eographic Society George E. Stuart.

Complete applications must be submitted by April 1. For information and pplications write to Robert L. Humphrey, Jr., Associate Professor of Anthroology, or Bernard M. Mergen, Assistant Professor of American Civilization, eorge Washington University, Washington, D.C. 20006.

MERICAN CIVILIZATION OR ANTHROPOLOGY

294A **Field Research in Historical Archaeology** (3)

Field techniques, including excavation, recording, photography, preservation, laboratory analysis and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md.

Movement Education Workshop

Y 8 TO MAY 17

PURPOSE OF THIS WORKSHOP is to help teachers gain insight into the wledge and skills necessary to solve current problems in movement educa-. Problems to be considered will include introducing movement education public school programs, innovative equipment, individualizing instruction, ceptual-motor training programs, early childhood programs, etc. Outside

specialists from the fields of early childhood and physical education will assist in the workshop.

Department preregistration and University admission by April 18 is required. The workshop is open to both graduate and undergraduate students. Three semester hours of credit may be earned, or the course may be audited. Graduate credit may be arranged. Students taking the course for credit must be admitted to the University.

Preregistration forms and additional information may be obtained from Jeanne Snodgrass, Associate Professor of Physical Education, Building K, George Washington University, Washington, D.C. 20006.

PHYSICAL EDUCATION, HEALTH, AND RECREATION

184A **Workshop in Physical Education** (3) Snodgrass and Staff
Problems in movement education. May 8–17: 5–9 pm; field activities, as arranged.

The New Journalism

FIRST SESSION—JUNE 3 TO JULY 10

THE DEPARTMENT OF JOURNALISM is offering an experimental course surveying "The New Journalism." Emphasis is on the impact of impressionistic writing and fiction techniques on non-fiction reporting, and on the role of advocacy in some areas of the field. Students study selected writers including Hersey, Capote, Talese, Wolfe, Mailer, and others to identify influences and trends in their non-fiction work. The class assesses the present and probable future influence of New Journalism upon Washington-based and other media.

A reading list will be available in advance from the Department of Journalism, George Washington University, Washington, D.C. 20006.

JOURNALISM

160A **The New Journalism** (3) Robbins
Survey of the impact of fiction techniques on modern non-fiction reportage. Study of selected writers to identify influences and trends. **MTWThF 11:10 am–12:30 pm.**

Oral History Institute

FIRST SESSION—JUNE 3 TO JULY 10

THIS INSTITUTE introduces students to the theory and practice of obtaining and using historical, autobiographical, and ethnographic data through recorded interviews. The staff of the Institute includes University faculty, local historians, and leaders of neighborhood history projects. Particular attention is given to local projects planned in conjunction with the Bicentennial and to the use of oral history for developing new local history materials for the schools.

The opening days of the Institute are devoted to an intensive workshop on the background of the oral history movement and on the methods of field interviewing. During the middle weeks of the session students are expected to complete a stated number of field interviews. The class meets occasionally to hear from directors of major oral history projects and to discuss important books written by oral historians. Each student is expected to complete a major paper based on a combination of field interviews and library research. The scope of this paper is determined by the nature of the student's research objectives.

The Institute is open to both graduate and undergraduate students. Persons wishing to enroll for graduate credit are required to do extra work and will need the permission of both their academic dean and the instructor.

Additional information and application forms may be obtained by writing to Roderick French, Division of Experimental Programs, George Washington University, Washington, D.C. 20006.

EXPERIMENTAL HUMANITIES

181A **Oral History Institute** (3)

Introduction to the theory and practice of obtaining and using historical data through recorded interviews. Examination of major published works in oral history. Particular attention to ongoing oral history projects in the Washington area. MTWThF 9:40–11 am.

Russian-East Asian Studies

THE INSTITUTE FOR SINO-SOVIET STUDIES is offering a program of related courses focused on Russia, Eastern Europe, and East Asia. These courses are broad enough to have general appeal as electives for the liberal arts student and sufficiently specific to have vocational utility for the teacher of social studies. Regular faculty members will offer thirteen courses in this program, ten in the first session and three in the second. Each course carries 3 semester hours of credit. Students majoring in Political Science should consult with their advisers before registering for this work.

The following faculty will staff the courses in this program:

Franz Michael, *Professor of International Affairs and Far Eastern History*
Andrew Gyorgy, *Professor of International Affairs and Political Science*
Harold C. Hinton, *Professor of Political Science and International Affairs*
Vladimir Petrov, *Professor of International Affairs*
Charles F. Elliott, *Associate Professor of Political Science and International Affairs*
William R. Johnson, *Associate Professor of History*
Richard C. Thornton, *Associate Professor of History*
Steven A. Grant, *Assistant Professor of Russian History and International Affairs*

FIRST SESSION—JUNE 3 TO JULY 10

HISTORY

145A **History of Russia: 18th and 19th Centuries** (3) Grant
From the reign of Peter the Great to the Russian Revolution. MTW
ThF 11:10 am–12:30 pm.

188A **History of Chinese Communism** (3) Thornton
Survey of the leadership, ideology, structure, and operation of the Chinese revolutionary movement of China from its founding to the present. MTWThF 6–7:20 pm.

214A **Evolution of the Socialist Commonwealth** (3) Petrov
History of Soviet relations with East European countries and the socialist states of Asia, from the end of World War II to the break with the People's Republic of China; emphasis on the changes in form and substance in relations among the ruling communist parties. For graduate students; open to qualified undergraduate seniors. MW 6–8:40 pm.

237A **Seminar: Soviet Foreign Policy, 1917–1953** (3) Petrov
Revolutionary concept of diplomacy. Parallel instruments of foreign policy during the era of "capitalist encirclement," 1917–1939. From Nazi-Soviet partnership to the alliance with the West. Foreign policies of the cold war. TTh 6–8:40 pm.

387A **Readings in the History of Sino-Soviet Relations** (3) Thornton
1917 to the present. MWF 8:10–10 pm.

POLITICAL SCIENCE

101A **Far East in the Modern World** (3) Michael
General character of Far Eastern societies and their response to the impact of America, Europe, and Russia; American policy in the Far East and the influence of world communism. MTWThF 8:10–9:30 am.

160A **Modern Communist Ideologies** (3) Elliott
Intensive study of modern communism: emphasis on its antecedents and possible evolution. Careers and ideas of leading figures: Marx, Lenin, Stalin, Khrushchev, and Mao. MTWThF 4:10–5:30 pm.

163A **Soviet Foreign Policy** (3) Elliott
Relations with United States, Third World, China; international communism; instruments of foreign policy; interrelationships of domestic and foreign policies; ideology and foreign policy. MTWTh 5:45–7:25 pm.

193A **Governments and Politics of South and Southeast Asia** (3) Hinton
Domestic and international politics of the major states in the area. MTWThF 11:10 am–12:30 pm.

*194A **Governments of China and Japan** (3) Michael
Institutions and processes of government in contemporary China and Japan, with some historical background. Attention to ideological forces. MTWThF 9:40–11 am.

* P Sc 162 and 194 are related in their subject matter, and credit for only one may be applied toward a degree.

SECOND SESSION—JULY 11 TO AUGUST 16

HISTORY

187B **History of Modern China** (3) Johnson
China since 1840, particular attention to political developments. MT WThF 1:10–2:30 pm.

396B **Readings in Modern Far Eastern History** (3) Johnson
MWTh 6:10–8 pm.

POLITICAL SCIENCE

*115B **Government and Politics in Eastern Europe** (3) Gyorgy
Study of the contemporary social and ethnic structures, governmental systems, and international position of the Eastern European states within the Soviet system. MTWThF 2:40–4 pm.

For courses in Beginning Intensive Mandarin Chinese and Intensive Beginning Russian, consult departmental listings under Chinese and Slavic Languages and Literatures.

Secondary School Honors Program

HE OUTSTANDING SECONDARY SCHOOL STUDENT who wishes to enrich his academic background and participate in a stimulating introduction to college work encouraged to seek admission to George Washington University's Secondary hool Honors Program. The Honors Student is enrolled in regular college urses appropriate to his level of study, his background, and his aptitude as termined through consultation with his high school counselors and advisers the University.

Since dormitory life is a vital part of the stimulating academic and cultural nosphere of the campus and community, Honors Students are allowed to e in Thurston Hall, a modern, air-conditioned residence dormitory. Students m the immediate metropolitan area may commute, but they are encouraged reside in the dormitory. Honors Students living in the dormitory are super-ed by well-trained resident counselors. A varied extracurricular program using upon the unique location of the University in the nation's capital has n planned to complement both the academic and social life of the campus. Credit earned in the Program is applicable toward a degree at George Washton University should the student later matriculate here. The transfer of dit elsewhere depends upon the policies of the individual school to which student might later apply.

All students admitted to the Program are appointed Scholars in the Second-School Honors Program and receive scholarships for a five-week session. ident students pay only $490, covering full tuition, board and room. Com-ing students receive a $94 scholarship for each 3- or 4-hour course. Lab-

*Sc 112, 115, and former P Sc 161 are related in their subject matter, and credit for only one e three may be applied toward a degree.

oratory fees and cost of books are not included in these scholarships. The Program is designed to include a normal summer session of two courses.

Since the Honors Program is limited to 80 secondary school students, admission is competitive. A transcript of the applicant's grades to date, available test scores, and evidence of emotional and intellectual maturity are criteria for admission.

Application forms and further information may be obtained from Bjorn Netland, Director of the Secondary School Honors Program, Division of University Students, George Washington University, Washington, D.C. 20006.

No applications will be considered after June 15.

Consult the *Undergraduate and Graduate Catalogue* for fall–spring concurrent program.

Summer Institute in Israel

A SEVEN-WEEK PROGRAM—JULY–AUGUST

A SPECIAL PROGRAM IN ISRAEL involves the study of the role which the geography, culture, and history of Israel have played in the growth and development of Judaism, Christianity, and Islam. Special attention is given to the contributions of archaeology, historical geography, history, and theology to the understanding of these religions. Field trips provide opportunity for study on historical sites.

Additional information, including costs of travel and tuition, may be obtained from Professor Robert G. Jones, Chairman, Department of Religion, George Washington University, Washington, D.C. 20006.

RELIGION

137A **The Land of Israel and the Growth of the Western Religions** (6) — Jones and Staff

Summer Institutes in Speech Pathology and Audiology

THE SPEECH PATHOLOGY AND AUDIOLOGY section of the Department of Speech and Drama is offering two consecutive Institutes which consider specific communication problems of the school-age child. The first Institute is divided into two courses of study in speech pathology and two in audiology, running concurrently. The content of these courses is designed, through lectures, discussions, and demonstrations of current practices and procedures, to enhance the knowledge of professionals in the field of communication disorders. Each course is supplemented with lectures and demonstrations by nationally known authorities who discuss a particular phase of the course content. The second Institute offers one course on clinical procedures for communication disorders. The content of this course applies to both children and adults; the course is offered immediately following the first Institute. A student may earn up to 9 semester hours of graduate credit during these Institutes. He may elect to take all 9 hours in one discipline, or 6 in one and 3 in the other. A prerequisite of

3 semester hours in the clinical management of speech and/or language disorders is required of those registering for the speech pathology course work, and 3 semester hours of basic principles and procedures in audiology are required of those registering for Sp&D 290A.

The following faculty staff the courses in this program:

James W. Hillis, *Professor of Speech*
Lloyd S. Bowling, *Associate Professor of Speech and Hearing*
Joan R. Regnell, *Assistant Professor of Speech*
Joseph P. Fox, *Assistant Professor of Speech*
Diane M. Brewer, *Assistant Professor of Speech*

A descriptive brochure is available upon request from Lloyd S. Bowling, Director, Summer Institute in Speech Pathology, and Audiology, Department of Speech and Drama, George Washington University, Washington, D.C. 20006.

FIRST INSTITUTE—JUNE 17 TO JULY 18

SPEECH AND DRAMA

106A **Introduction to Audiology** (3) Bowling
(Formerly Sp&D 182)
Survey of the field of audiology. The effect of body-system pathologies on the reception of speech and other acoustic stimuli. Procedures of pure-tone and speech audiometry. Clinical and educational services for the hearing-impaired. Prerequisite: Sp&D 101. MTWTh 1-2:40 pm.

278A **Language Disorders II** (3) Fox
(Formerly Advanced Clinical Practice in Speech and Hearing)
A psycholinguistic model for speech and language disorders. Presentation of a psycholinguistic model of communication based on transformational generative grammar theory and its application to the study of normal and abnormal speech and language behavior in children. Laboratory fee, $5. MTWTh 9:20–11 am.

279A **Language Disorders III** (3) Regnell
(Formerly Anatomy and Physiology of Speech and Hearing)
Language therapy for school children. Study of speech and language evaluation and therapy procedures in public schools based on modern linguistics and concepts. Video-taped demonstrations. Laboratory fee, $5. MTWTh 11:10 am–12:30 pm.

290A **Management of the Hearing-impaired Child** (3) Brewer
Overall management approach to the hard-of-hearing child including diagnosis, parent counseling, amplification, educational placement, treatment programs and procedures, and re-evaluation. Emphasis on aural habilitation within an educational framework. Laboratory fee, $7.50. MTW Th 2:50–4:30 pm.

SECOND INSTITUTE—JULY 22 TO AUGUST 15

SPEECH AND DRAMA

119B **Clinical Procedures for Communication Disorders** (3) Hillis
Development of skill in precision treatment techniques for communication disorders. Emphasis on accountability of providers of clinical and

educational services for the communicatively handicapped. Prerequisite: Psyc 121 and 131, or equivalent; senior standing or permission of instructor. MTWTh 9:20–11 am.

Workshop in Comparative European Physical Education and Recreation

JUNE 17 TO JULY 5

THE DEPARTMENT OF PHYSICAL EDUCATION, HEALTH, AND RECREATION has invited the well-known British authority, Mr. Joe Jagger, to conduct a special workshop in comparative European physical education methods. Presently a principal lecturer in physical education at St. Mary's College of Education, Strawberry Hill, Twickenham, Middlesex, Mr. Jagger is Chairman of the University of London Physical Education Panel and Vice-Chairman of the Faculty Committee in Movement Education. His special competencies are in educational aspects of physical education, including philosophy, methodology, teaching development; and in basketball, swimming, and outdoor education. He has written numerous textbooks and other publications on physical education and recreation.

For further information and application forms, write to Professor James L. Breen, Chairman, Department of Physical Education, Health, and Recreation, Building K, George Washington University, Washington, D.C. 20006.

PHYSICAL EDUCATION, HEALTH, AND RECREATION

184B **Workshops in Physical Education** (3) Jagger

Physical Education from an international perspective: general philosophy and current trends in physical education programs; analysis of various systems and teaching techniques. MTWThF 4–6 pm.

Workshop on the Politics of the Information Process

FIRST SESSION—JUNE 3 TO JULY 10

CERTAIN PRINCIPLES OF DEMOCRATIC THEORY have lately come into conflict, raising serious questions of public policy. A major conflict has developed between those who feel that effective governance and national survival require that certain kinds of information be kept out of the public domain and others who contend that public access to information should be unrestricted.

Perhaps at no point in the history of the Republic has the need for information been more acute. The unprecedented array of critical issues—air and water pollution, transportation, crime and the administration of justice, and the accountability of government to the people—require measured judgment by all citizens and government officials.

This Workshop draws upon the resources of the National Law Center, interested departments in the Columbian College, and experts in the field. The

Primary emphasis is on Congressional committees and the means by which such committees acquire and dispense information. Specific case studies on issues of contemporary concern are conducted, with heavy emphasis on off-campus research and study.

The Workshop is open to both graduate and undergraduate students.

Additional information and application forms may be obtained by writing to Gregory H. Williams, Division of Experimental Programs, George Washington University, Washington, D.C. 20006.

EXPERIMENTAL HUMANITIES

197A **Workshop on the Politics of the Information Process** (3)

Examination of the process by which Congressional committees acquire and dispense information. Selected study and research on issues of contemporary concern. MTWThF 9:40–11 am.

COURSES OF INSTRUCTION

EXPLANATION OF COURSE NUMBERS

COLLEGES AND SCHOOLS OTHER THAN ENGINEERING AND APPLIED SCIENCE

First-group courses.—Courses numbered from 1 to 100 are planned for students in the freshman and sophomore years. With the approval of the adviser and the Dean, they may also be taken by juniors and seniors. In certain instances, they may be taken by graduate students to make up undergraduate deficiencies or as prerequisite to advanced courses, but they may not be taken for graduate credit.

Second-group courses.—Courses numbered from 101 to 200 are planned for students in the junior and senior years. They may be taken for graduate credit only upon the approval of the dean and the instructor at the time of registration. Such approval is granted only with the provision that students must complete additional work in order to receive graduate credit.

Third-group courses.—Courses numbered from 201 to 300 in the Graduate School of Arts and Sciences, the School of Government and Business Administration, and the School of Public and International Affairs, and courses numbered 201 to 400 in the School of Education are planned primarily for graduate students. They are open, with the approval of the instructor, to qualified seniors; they are not open to other undergraduates.

Fourth-group courses.—Courses numbered 301 to 400 in the Graduate School of Arts and Sciences are limited to graduate students, but they are primarily for doctoral candidates. Courses numbered 301 to 400 in the School of Government and Business Administration are limited to doctoral students. In the School of Education fourth-group courses, numbered 401 to 500, are limited to graduate students with Master's degrees from accredited institutions.

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Courses numbered from 1 through 199 are planned for undergraduate credit, although certain courses may be taken for graduate credit when arrangements are approved in advance by the instructor and the Dean. Courses numbered 201 to 300 are planned for graduate credit and may in certain instances be taken by qualified undergraduate students. Courses numbered from 301 to 400 are primarily for doctoral students.

EMESTER HOURS OF CREDIT

The number of semester hours of credit given for the satisfactory completion f a course is in most cases indicated in parentheses after the name of the ourse.

EY TO ABBREVIATIONS

The following abbreviations are used in this catalogue for course designations.

Acct	Accounting	HCA	Health Care Administration
AmCv	American Civilization	Hist	History
Anth	Anthropology	Jour	Journalism
Ap S	Applied Science	Mgt	Management Science
Art	Art	Math	Mathematics
A Th	Art Therapy	ME	Mechanical Engineering
B Sc	Biological Sciences	Med	Medicine
B Ad	Business Administration	Mus	Music
Chem	Chemistry	OR	Operations Research
Chin	Chinese	Phil	Philosophy
Clas	Classics	PE	Physical Education, Health, and Recreation
CS	Computer Science	Phys	Physics
Econ	Economics	P Sc	Political Science
Educ	Education	Psyc	Psychology
EE	Electrical Engineering	P Ad	Public Administration
E Ad	Engineering Administration	Rel	Religion
Engl	English	Slav	Slavic Languages and Literatures
Hum	Experimental Humanities	Soc	Sociology
ForS	Forensic Sciences	Span	Spanish
Fren	French	S Ed	Special Education
Geol	Geography and Regional Science	Sp&D	Speech and Drama
Geog	Geology	Stat	Statistics
Germ	Germanic Languages and Literatures	U&RP	Urban and Regional Planning

e Schedule of Classes for the Summer Sessions, which will be available in ril at the Office of the Registrar, will contain information about room gnments and instructors for courses.
he University reserves the right to change or withdraw any of the following rses.

ounting

Mastro, *Chairman*

1–2 Introductory Accounting (3–3)

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communication of significant economic and financial data. Prerequisite to Acct 2: Acct 1. Students who have received credit for Acct 115 cannot receive credit for Acct 1–2.
First Session: Acct 1A; Second Session: Acct 2B. MTWTh 5:45–7:25 pm.

101A Cost and Budgetary Control (3)

Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 215 cannot receive credit for Acct 101. First Session: MTWTh 5:45–7:25 pm.

111B Financial Statement Analysis (3)

Analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2. Second Session: MTWTh 7:35–9:15 pm.

***115 Survey of Financial Accounting** (3)

Development, presentation, and interpretation of financial accounting data necessary to the management process. Students who have received credit for Acct 1–2 cannot receive credit for Acct 115. First Session: Section A—MTWTh 5:45–7:25 pm.

193A Business Budgeting (3)

Principles and procedures in the development, installation, and operation of a system of budgetary control to aid management. Prerequisite: Acct 1–2. Students who have received credit for Acct 101 cannot receive credit for Acct 193. First Session: MTWTh 7:35–9:15 pm.

†215 Survey of Managerial Accounting (3)

Study of the nature, analysis, and interpretation of accounting reports primarily from the management point of view. Prerequisite: Acct 1–2 or 115. Students who have received credit for Acct 101 cannot receive credit for Acct 215. Second Session: Section B—MWTh 8:10–10 pm.

262B Business Income Taxation (3)

Federal income tax concepts applicable to corporations, partnerships, and their owners; emphasis on tax planning factors in business decisions and tax research. Second Session: MWTh 6:10–8 pm.

276B Management Planning and Control (3)

Integrative case study approach to management systems for planning, control, and decisions: value indices for organizational sub-units, transfer pricing, contemporary control systems, accounting framework and cycle. Prerequisite: Acct 1–2 or 115. Second Session: MWTh 6:10–8 pm.

282A Accounting Information Systems (3)

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 1–2 or 115. First Session: MWTh 8:10–10 pm.

299A Thesis Seminar (3)

First Session: As arranged.

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* Special sections of this course will be offered in Navy programs. Acct 115B, for students in the Navy Graduate Financial Management Program, May 27 to July 19; hours to be arranged. Acct 115C, for students in the Bachelor of Science in Health Care Administration degree program at the Naval School of Hospital Administration, Bethesda, Md., August 10 to November 16; hours to be arranged.

† A special section of this course, Acct 215C, for students in the Navy Graduate Financial Management Program, will be offered July 22 to August 23; hours to be arranged.

300A **Thesis Research** (3)
Second Session: As arranged.

merican Civilization

dministered by the American Studies Program, Bernard Mergen, *Director*

71–72 **Introduction to American Civilization** (3–3)
Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance. First Session: AmCv 71A; Second Session: AmCv 72B. MTWThF 11:10 am–12:30 pm.

*192A **The American Cinema** (3)
First Session: T 6:30–9 pm, WTh 6:10–8 pm. (See American Cinema since 1950 program, page 37.)

195 **Independent Study** (3)
Open to limited number of American Civilization majors with approval of instructor. First Session: Section A; Second Session: Section B. As arranged.

†225A **History of Washington, D.C.** (3)
First Session: TTh 6:10–8 pm; field trips as arranged. (See Capital City Historical Seminar, page 39.)

251–52 **Museum Research and Education** (3–3)
Supervised work and/or study under the direction of Smithsonian Institution staff members and research associates—museum visitor behavior, costumes and furnishings, and photography as historical documentation.
First Session: AmCv 251A; Second Session: AmCv 252B. As arranged.

271B **Seminar: Research and Teaching in American Civilization** (3)
Consideration of American studies as an area for research and teaching; introduction to bibliography. Required of candidates for the degree of Master of Arts in the field of American Civilization. Second Session: As arranged.

294A **Field Research in Historical Archaeology** (3)
A 10-week course, June 17 to August 23, at St. Mary's City, Md. (See Field Research in Historical Archaeology program, page 43.)

295 **Independent Study** (arr.)
Limited to Master's candidates. Permission of instructor, in writing, required. First Session: Section A; Second Session: Section B.

–300 **Thesis Research** (3–3)
AmCv 299A and 300A: both sessions.

389A **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general exami-

offering of the American Studies Program and the Department of Speech and Drama. Stu- may register under either designation.
offering of the American Studies Program and the Department of History. Students may under either designation.

nation in fields offered in affiliation with the Library of Congress. May be repeated for credit. Both sessions.

390A **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations based upon or significantly related to collections of the Library of Congress. Supervised by specialists at the Library. Prerequisite: AmCv 355–56. Both sessions.

394A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination in fields offered in affiliation with the Smithsonian Institution. May be repeated for credit. Both sessions.

395A **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations significantly related to the material aspects of American civilization. Students work under curatorial supervision at the Smithsonian Institution. Prerequisite: AmCv 351–52. May be repeated for credit. Both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

For information concerning programs in American Cinema since 1950. Capital City Historical Seminar, and Field Research in Historical Archaeology, see pages 37, 39, and 43.

Anthropology

R.L. Humphrey, Jr., *Chairman*

Departmental prerequisite: Anth 1–2 is prerequisite to all other courses in Anthropology except Anth 158 and 162. This prerequisite may be waived by permission of instructor.

1–2 **Introductory Anthropology** (3–3)

Anth 1: survey of man's origin, physical evolution, and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior. First Session: Anth 1A; Second Session: Anth 2B. MTWThF 11:10 am–12:30 pm.

155A **Primitive Religion** (3)

Conceptions of the supernatural in nonliterate societies. Examination of religious beliefs and practices. Emphasis on religious process and change. First Session: MTWThF 1:10–2:30 pm.

177A **Cultures of the Near East** (3)

Study of the geographic environment, language, religion, and social structure of settled and nomadic peoples of the Near East; emphasis on the Arab world. First Session: MTWThF 9:40–11 am.

195 **Undergraduate Research** (3)

Individual research problems. May be repeated for credit. First Session: Section A; Second Session: Section B. As arranged.

215A **Field Methods in Cultural Ecology: Pre-Columbian Settlement Patterns in the Tehuacan Valley** (6)

June 3 to 30. (See Field Program in Pre-Columbian Cultural Ecology, page 42.)

254A **Seminar: Folklore in America** (6)

June 10–29: MTWThF 9 am–4 pm. (See American Folklore Seminar, page 38.)

290 **Advanced Museum Research** (3)

Supervised individual research and/or field work at the Smithsonian Institution, arranged in consultation with the Smithsonian and the Department of Anthropology. Admission by permission of the Chairman of the Department. May be repeated for credit. First Session: Section A; Second Session: Section B. As arranged.

294A **Field Research in Historical Archaeology** (3)

A 10-week course, June 17 to August 23, at St. Mary's City, Md. (See Field Research in Historical Archaeology program, page 43.)

295 **Research** (3)

May be repeated for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Anth 299A and 300A: both sessions.

For information concerning the American Folklore Seminar, Field Program in Pre-Columbian Cultural Ecology, and Field Research in Historical Archaeology, see pages 38, 42–43.

pplied Science

e "Engineering and Applied Science."

Art

W.A. MacDonald, *Chairman*

ART HISTORY

31–32 Survey of Western Art (3–3)

Survey of the arts in the Western world from prehistoric to modern times. A foundation for further study in the history of art. First Session: Art 31A; Second Session: Art 32B. MTWThF 11:10 am–12:30 pm.

108A 18th Century Art in Europe (3)

Development of painting, sculpture, and achitecture. First Session: MTWThF 8:10–9:30 am.

109A 19th Century Art in Europe (3)

Painting and sculpture. First Session: MTWThF 9:40–11 am.

110B Contemporary Art (3)

Painting and sculpture in 20th century Europe. Second Session: MTWThF 11:10 am–12:30 pm.

112A Art of Egypt and the Ancient Orient (3)

Study of the art of Mesopotamia, Anatolia, Egypt, and Persia. First Session: MTWThF 11:10 am–12:30 pm.

113B Baroque Art in Italy (3)

Development of painting, sculpture, and architecture in 16th and 17th century Italy. Second Session: MTWThF 1:10–2:30 pm.

114A Baroque Art in the North (3)

Development of painting, sculpture, and architecture in the 16th and 17th centuries in Holland, Flanders, Spain, France, Germany, and England. First Session: MTWThF 9:40–11 am.

115B Christian Iconography (3)

Origins and development of Christian symbols and themes from early Christian to modern times. Second Session: MTWThF 4:10–5:30 pm.

117B Medieval Art I (3)

Architecture, sculpture, and painting of the early Christian and Byzantine periods. Second Session: MTWThF 9:10–11 am.

120A Art of China and Japan (3)

Architecture, painting, and sculpture of China, Korea, and Japan. First Session: MTWThF 1:10–2:30 pm.

147B Pre-Columbian Art (3)

Second Session: MTWTh 5:45–7:25 pm.

155 Etruscan Art and Archaeology (6)

August 1 to 31. (See Art and Archaeology Program in Italy, pages 38–39.)

*207A **Modern Architecture** (3)

Development of modern architecture and building technology in Europe and America from the late 19th century to the present. First Session: MTWThF 4:10–5:30 pm.

242 **Etruscan Art and Archaeology** (6)

August 1 to 31. (See Art and Archaeology Program in Italy, pages 38–39.)

246A **Seminar: Classical Art** (3)

Specific area announced in *Schedule of Classes.* First Session: MTW ThF 9:40–11 am.

248 **Independent Research** (3)

For Master's degree candidates; open to limited number of qualified undergraduates, with permission. Independent research arranged in consultation with individual instructor and graduate adviser. May be repeated for credit. First Session: Section A; Second Session: Section B.

261A **Seminar: Problems in Art History** (3)

Topic for summer: Europe and America, 1850–1900. Recommended for Art History majors; open to limited number of qualified undergraduates, with permission of instructor. Theory, criticism, or methodology of art history. May be repeated for credit. First Session: MTWThF 4:10–5:30 pm.

289–90 **Thesis Research** (3–3)

Art 289A and 290A: both sessions.

FINE ARTS

Unless otherwise indicated, Fine Arts courses taught in University studios carry no material or laboratory fees; students must purchase their own materials. Laboratory and material fees for courses taught at the Corcoran School of Art are stated in the course description and are payable at the school.

Courses designated CSA are taught at the Corcoran School of Art; courses designated GWU are taught at George Washington University campus studios.

Departmental prerequisite: Art 21–22 and 41–42 (students concentrating in photography substitute Art 23–24 for 41–42) or permission of Department Chairman are prerequisite to all other studio courses in Art.

Fine Arts courses numbered 121 through 281 may be repeated for credit with approval of Department.

*21–22 **Design I: Basic** (3–3)

Fundamental studies of principles and elements of design. Art 21: study of two-dimensional design. Art 22: three-dimensional studies. First Session: Art 21A (CSA)—MTWThF 1–4 pm; Art 21B (GWU)—MTWThF 4:10–7:10 pm; Art 22A (GWU)—MTWThF 9–12 am.

*may be taken for undergraduate credit with the approval of the instructor.
required of all Fine Arts majors.

23–24 Fundamentals of Photography (3)

Fundamental techniques of photography; emphasis on creative expression. Laboratory fee: Art 23, $25; Art 24, $25. First Session: Art 23A (CSA)—lecture, W 12:30–1:30 pm; laboratory, MTW 1:30–6 pm. First Session: Art 23B (CSA)—lecture, Th 12:30–1:30 pm; laboratory, ThFS 8 am–12:30 pm. First Session: Art 23C (CSA)—lecture, M 6–7 pm; laboratory, TW 6–10 pm and M 7–10 pm. First Session: Art 24A (CSA)—lecture, M 12:30–1:30 pm; laboratory, MTW 8 am–12:30 pm. Second Session: Art 23D (GWU)—lecture, MW 12–1 pm; laboratory section M, MTW 8–12 am; laboratory section N, MTW 1–5 pm.

41–42 Drawing I (3–3)

Concepts of drawing, traditional and contemporary; training in perception, analysis of form, use of media, and exercises in connoisseurship. First Session: Art 41A (CSA) and 42A (CSA)—MTWThF 9–12 am; Art 41B (GWU), 41C (CSA), and 42B (CSA)—MTWThF 1–4 pm; Art 41D (CSA) and 42C (CSA)—MTWThF 6:30–9:30 pm. Material and model fee for Art 41B, $15.

51–52 Ceramics I (3–3)

Working with clay as an art form. Basic techniques of hand building and wheel throwing. Laboratory fee: Art 51, $45; Art 52, $45. First Session: Art 51A (GWU)—MTWThF 9–12 am; Art 51B (CSA) and Art 52A (CSA)—MTWThF 1–4 pm; Art 51C (CSA) and 52B (CSA)—MTWThF 6:30–9:30 pm. Second Session: Art 51D (GWU)—MTWThF 1–4 pm.

57A Graphics I (3) GWU

Exploration of the methods of intaglio, relief, printing, and other composite processes. Material fee, $20. First Session: MTWThF 1–4 pm.

61A Water Color (3) CSA

Painting in transparent and opaque water color and in acrylic. Experimentation, figurative and landscape. First Session: MTWThF 9–12 am.

65–66 Painting I (3–3) CSA

Emphasis on personal expression with exposure to a variety of styles and attitudes. Use of acrylic and oil. First Session: Art 65A and 66A—MTWThF 9–12 am; Art 65B and 66B—MTWThF 6:30–9:30 pm.

81–82 Sculpture I (3–3) CSA

Three-dimensional design. Basic sculptural techniques; modeling, carving, and construction. Media include wood, clay, stone, plaster. Laboratory fee: Art 81, $25; Art 82, $25. First Session: Art 81A and 82A—MTWThF 9–12 am.

123A Design II: Individual Problems (3) GWU

Emphasis on the individual student and the problems and materials that specifically interest him in any area of design. First Session: MTWThF 1–4 pm.

125–26 Painting II (3–3) CSA

Emphasis on personal expression; exposure to a variety of styles and attitudes. Materials and techniques subordinate to individual experimentation. Use of acrylic and oil. First Session: Art 125A and 126A—MTWThF 1–4 pm; Art 125B and 126B—MTWThF 6:30–9:30 pm.

127–28 **Painting III** (3–3)

Exploration of problems in developing a personal visual imagery. First Session: Art 127A (CSA) and 128A (CSA)—MTWThF 1–4 pm; Art 127B (CSA) and 128B (CSA)—MTWThF 6:30–9:30 pm. Second Session: Art 127C (GWU)—MTWThF 9–12 am; material fee for Art 127C, $12.

131–32 **Ceramics II** (3–3)

Development of techniques with emphasis on quality and creativity. Laboratory fee: Art 131, $45; Art 132, $45. First Session: Art 131A (GWU), Art 131B (CSA), and Art 132A (CSA)—MTWThF 1–4 pm; Art 131C (CSA) and Art 132B (CSA)—MTWThF 6:30–9:30 pm. Second Session: Art 131D (GWU)—MTWThF 9–12 am.

135A **Advanced Water Color** (3) CSA

Development of techniques of water color; concentration on special projects. First Session: MTWThF 9–12 am.

137B **Workshop in Materials, Methods, and Techniques** (3) GWU

Drawing in charcoal, crayon, and pen; painting and preparation of grounds for tempera, encaustic, fresco buono, oil, water color, polymer, and mixed techniques; graphic techniques in woodcut, engraving, etching. Material and model fee, $10. Second Session: MTWThF 1–4 pm.

143–44 **Serigraphy** (3–3) GWU

Advanced problems in serigraphy; emphasis on its aesthetic possibilities. Prerequisite: Art 57–58. First Session: Art 143A—MTWThF 9–12 am; Art 144A—MTWThF 1–4 pm.

151–52 **Ceramics III** (3–3) CSA

Development of techniques with emphasis on quality and creativity. Students mix own clay and glazes. Laboratory fee: Art 151, $45; Art 152, $45. First Session: Art 151A and 152A—MTWThF 1–4 pm; Art 151B and 152B—MTWThF 6:30–9:30 pm.

153B **Graphics II** (3) GWU

Advanced relief, intaglio, and other composite processes. Prerequisite: Art 57–58. Material fee, $20. Second Session: MTWThF 9–12 am.

157–58 **Graphics III** (3–3)

Exploration of combined techniques and mixed media. Prerequisite: Art 153–54. First Session: Art 157A (CSA) and 158A (CSA)—MTWThF 9–12 am. Second Session: 157B (GWU)—MTWThF 1–4 pm. Material fee: Art 157A, $30; Art 158A, $30; Art 157B, $20.

159–60 **Drawing II** (3–3) CSA

Development of drawing. Individual study, application and extensions of drawing. First Session: Art 159A and 160A—MTWThF 6:30–9:30 pm.

179–80 **Sculpture II** (3–3) CSA

Concepts of sculpture; new materials and developments. Laboratory fee: Art 179, $25; Art 180, $25. First Session: Art 179A and 180A—MTWThF 9–12 am.

181A **Intermediate Photography** (3) GWU

Basic problems. Introduction to color photography with emphasis on crea tive expression. Prerequisite: Art 23–24 or permission of instructor. Lab oratory fee, $25. First Session: lecture MW 12–1 pm; laboratory sec tion M, MTW 8–12 am; laboratory section N, MTW 1–5 pm.

189–90 **Sculpture III** (3–3) CSA

Advanced study concentrating on relevance of scale and media. Rela tionship of sculpture to the environment. Laboratory fee: Art 189, $25 Art 190, $25. First Session: Art 189A and 190A—MTWThF 9–12 am.

205A **Advanced Photography** (3) CSA

Advanced problems in photography; emphasis on individual development Prerequisite: Art 181–82 or permission of instructor. Laboratory fee, $25 First Session: lecture M 12:30–1:30 pm, laboratory MTW 8 am–12:30 pm.

206A **Photography: Special Projects** (3) GWU

Laboratory fee, $25. First Session: As arranged.

231A **Design III** (3) GWU

New media and techniques in three-dimensional design. Laboratory fee $15. First Session: MTWThF 9–12 am.

251–52 **Ceramics IV** (3–3) CSA

Development of techniques with emphasis on quality and creativity. Stu dents mix own clay and glazes. Laboratory fee: Art 251, $45; Art 252, $45. First Session: Art 251A and 252A—MTWThF 1–4 pm; Art 251B and 252B—MTWThF 6:30–9:30 pm.

253A **Ceramics V** (3) CSA

Laboratory fee, $45. First Session: As arranged.

265–66 **Painting IV** (3–3) CSA

Creative painting; students work on independent projects as well as as signed problems. First Session: Art 265A and 266A—MTWThF 1–4 pm; Art 265B and 266B—MTWThF 6:30–9:30 pm.

279–80 **Sculpture IV** (3–3) CSA

Laboratory fee: Art 279, $25; Art 280, $25. First Session: Art 279A and 280A—MTWThF 9–12 am.

281A **Sculpture V** (3) CSA

Laboratory fee, $25. First Session: MTWThF 9–12 am.

299–300 **Thesis Research** (3–3)

Art 299A and 300A: both sessions.

For information concerning the Art and Archaeology Program in Italy, see pages 38–39.

Art Therapy—Graduate Study

M. Levy, *Program Director*

283–84 **Practicum in Art Therapy** (3–3)

Field experience. On-the-job supervision supplemented by supervision from the therapy staff. Prerequisite: A Th 201, 203, and consultation with adviser prior to registration. First Session: A Th 283A; Second Session: A Th 284B. As arranged.

285 **Special Projects in Art Therapy** (3)

Individual work based on study, research, or practice. Details to be worked out with each student. Resource people may be called upon to assist, as appropriate. May be repeated for credit with approval of adviser. First Session: Section A; Second Session: Section B. As arranged.

Biological Sciences

H. Desmond, *Chairman*

Departmental prerequisite: B Sc 11–12 or equivalent is prerequisite to all second-group courses in Biology, Botany, and Zoology, except by permission of the instructor.

3–4 **Introductory Biology for Nonscience Majors** (3–3)

Survey of biological principles; emphasis on man as a functional organism in his environment. Prerequisite to B Sc 4: B Sc 3. Material fee, $12 each session. First Session: B Sc 3A; Second Session: B Sc 4B. MTW 6–9:20 pm.

11–12 **Introductory Biology for Science Majors** (4–4)

Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Prerequisite to B Sc 12: B Sc 11. Material fee, $15 each session. First Session: B Sc 11A; Second Session: B Sc 12B. MTWThF 9:40 am–1 pm.

104A **Comparative Vertebrate Anatomy** (4)

Evolution and comparative morphology of vertebrates, stressing recent forms. Material fee, $18. First Session: MTWThF 6–9:20 pm.

145A **Introduction to Vertebrate Embryology** (4)

Origin and early development of the individual, formation of organ systems. Emphasis on frog, chick, and pig, with reference to human embryo. Material fee, $18. First Session: MTWThF 9:40 am–1 pm.

148B **Histology** (4)

Introduction to microscopical anatomy of normal tissues and organs with emphasis on the interrelationship of structure and function. Material fee, $18. Second Session: MTWThF 9:40 am–1 pm.

163B Human Physiology (3)

Introduction to the function of organ systems of the human body. Second Session: MWF 6–9:20 pm; TTh 6–7 pm.

164B Human Physiology Laboratory (1)

Study of basic physiology laboratory techniques; emphasis on the experimental study of homeostatic mechanisms in humans. Prerequisite or concurrent registration: B Sc 163. Material fee, $20. Second Session: TTh 7:10–9:20 pm.

171 Undergraduate Research (arr.)

Admission by permission of the staff member concerned. May be repeated for credit. Prerequisite: Chem 50 or 152; 16 semester hours in Biological Sciences courses. Material fee, $18. First Session: Section A; Second Session: Section B. As arranged.

230A Understanding Environmental Issues—Water Pollution (6)

June 17–July 12: MTWThF 9–11 am and 1:30–3:30 pm; Saturday field trips as arranged. July 15–19: workshop as arranged. (See Environmental Issues Program, pages 41–42.)

295 Research (arr.)

Investigation of special problems. May be repeated for credit. First Session: Section A; Second Session: Section B.

299–300 Thesis Research (3–3)

B Sc 299A and 300A: both sessions.

398A Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

For information concerning Environmental Issues Program, see pages 41–42.

Business Administration

H.R. Page, *Chairman*

101A The Business Environment (3)

Economic and legal environment of business enterprise; social and political influences; contemporary problems and issues. First Session: MTWThF 1:10–2:30 pm.

*102A **Fundamentals of Management** (3)

Planning, organizing, directing, coordinating, and controlling activities of the administrative unit; evolution of management thinking. First Session: MTWThF 2:40–4 pm.

105A **Personnel Management** (3)

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities. First Session: MTWTh 4–5:40 pm.

106B **Problems in Personnel Management** (3)

Principles and problems of personnel management and industrial relations illustrated by cases drawn from industry and government. Prerequisite: B Ad 105. Second Session: MTWTh 5:45–7:25 pm.

131A **Business Finance** (3)

Analyzing capital requirements and methods of acquiring funds; planning efficient use of capital. Asset management, financial analysis, sources of funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51. First Session: MTWThF 4:10–5:30 pm.

132A **International Business Finance** (3)

Principles, practices, problems, and institutions of international finance. Emphasis on international financial markets, exchange rates, balance-of-payments restraints, and governmental policies. Prerequisite: B Ad 131. First Session: MTWTh 7:35–9:15 pm.

138B **Investment and Portfolio Management** (3)

Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2, B Ad 131. Second Session: MTWThF 4:10–5:30 pm.

141B **Basic Marketing Management** (3)

Marketing and marketing management, consumer and demand analysis, retailing, wholesaling. Emphasis on major decision areas and tools. Prerequisite: B Ad 102, Econ 1–2. Second Session: MTWThF 4:10–5:30 pm.

161A **Commercial Law: Contracts, Sales, Agency, Bailments** (3)

First Session: MTWTh 7:35–9:15 pm.

181B **Manufacturing Production** (3)

Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from various process and fabrication industries. Second Session: MTWTh 4–5:40 pm.

192A **Internship in Business Administration** (arr.)

Internship assignment with an extramural sponsor: a business firm, a business-related government agency, or an interest group. Open to selected juniors and seniors by permission of adviser. First Session: As arranged.

*Special section of this course, B Ad 102B, for students in the Bachelor of Science in Health Administration degree program at the Naval School of Hospital Administration, Bethesda, will be offered August 10 through November 16; hours to be arranged.

199B Individual Research (3)

Assigned topics. Admission by prior permission of adviser. May be repeated once for credit. Second Session: As arranged.

231A Financial Decision-making (3)

Functions and objectives of financial management, asset management, problems of internal financial analysis, rate-of-return analysis, financial forecasting, problems of capital demand and supply. Prerequisite: Acct 115 or equivalent, B Ad 131. First Session: MWF 6:10–8 pm.

233A International Business Finance (3)

Analysis of problems in international business finance. Impact of the evolving international payments system on business. Prerequisite: B Ad 131 or equivalent. First Session: MWF 4:10–6 pm.

237B Investment Analysis (3)

Risk-reward analysis of security investments including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: B Ad 131. Second Session: MWF 6:10–8 pm.

241B Marketing Management (3)

Marketing management problems; market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs. Second Session: MWF 6:10–8 pm.

255A International Business in Perspective (3)

The nature and order of magnitude of international business; global patterns of trade and investment; international and national institutions; policy issues, trends. First Session: TTh 6:10–9 pm.

257B Operation of the Multinational Firm (3)

International market entry and expansion; operating policies, procedures, and problems of multinational companies; developing executives for international business. Prerequisite: advanced Master's degree standing. Second Session: MWTh 6:10–8 pm.

259B Comparative Business Management (3)

Primarily for doctoral students. Comparative analysis of business practices and management in different countries and economic systems. Generic characteristics of management and of business enterprises and how these are modified in different environments. Influence on the level of economic development, social structure, history, and culture of a country. Prerequisite: Mgt 201 or equivalent. Second Session: MWF 6:10–8 pm.

260A Economics for Management (3)

For students in the Navy Graduate Financial Management Program only. Economic theory and its application in managerial decision-making; price theory, income and employment theory, related topics. Review of economic methodology. May 27–July 19: As arranged.

265B Seminar: Managerial Economics (3)

Primarily for doctoral students. Special topics and applications of analytical tools to business decision-making and policy. Prerequisite: B Ad 261, 262; or permission of instructor. Second Session: TTh 6:10–9 pm.

280A **Procurement and Contracting** (3)

For students in the Navy Graduate Financial Management Program only. Overview of procurement and contracting; emphasis on federal government buying policies, practices, and procedures. May 27–July 19: As arranged.

291B **Seminar: Business Management** (3)

Primarily for doctoral students. Research on various phases of management as practiced in American industry. Second Session: MWF 4:10–6 pm.

298 **Readings in Business** (3)

Supervised readings in selected fields within business administration. Admission by prior permission of instructor. May be repeated once for credit. First Session: Section A—MWF 4:10–6 pm. Second Session: Section B—MWF 8:10–10 pm.

299A **Thesis Seminar** (3)

Examination of thesis standards, research philosophy and methodology. First Session: As arranged.

300A **Thesis Research** (3)

Second Session: As arranged.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Business Administration general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Business Administration candidates. May be repeated for credit. Both sessions.

hemistry

D. Britt, *Chairman*

11–12 **General Chemistry** (4–4)

Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $21 each session. First Session: Chem 11A; Second Session: Chem 12B. MWF 8:10 am–1 pm; TTh 8:10–11:10 am.

110A **Introduction to Physical Chemistry** (3)

Topics include chemical thermodynamics, chemical kinetics, electrochemistry, solution chemistry, membrane and phase equilibria, and others. Prerequisite: Chem 16 or 22, Math 31, Phys 2; or permission of instructor. Not open to chemistry majors. May not be taken for credit by students who have received credit for Chem 111–12 or an equivalent course. A 6-week course, June 3 to July 17: MTWTh 6–7:15 pm.

51–52 **Organic Chemistry** (3–3)

Chemistry of the compounds of carbon. Prerequisite to Chem 151: Chem

12 or 16. Prerequisite to Chem 152: Chem 151. First Session: Chem 151A; Second Session: Chem 152B. MTWThF 8:10–9:40 am.

153–54 **Organic Chemistry Laboratory** (1–1)

Laboratory complement of Chem 151–52. Prerequisite or concurrent registration: Chem 151–52. Prerequisite to Chem 154: Chem 153. Laboratory fee, $21 each session. First Session: Chem 153A; Second Session: Chem 154B. MWF 9:50 am–1 pm.

195 **Undergraduate Research** (arr.)

Research on problems approved by the staff. May be repeated once for credit. Laboratory fee, $10.50 a semester hour. First Session: Section A; Second Session: Section B. As arranged.

295 **Research** (arr.)

Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit not to exceed a total of 8 semester hours. Laboratory fee, $10.50 a semester hour. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Chem 299A—both sessions; laboratory fee, $21 each session. Chem 300A—both sessions; laboratory fee, $21 each session.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy cumulative examinations. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Chinese

Administered by the Department of East Asian Languages and Literatures, Chung-wen Shih, *Acting Chairman*

7–8 **Beginning Intensive Mandarin Chinese** (6–6)

Intensive beginners' course in fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 8: Chin 7. Laboratory fee, $17.50 each session. June 3 to July 5: Chin 7A*; July 8 to August 9: Chin 8B. Classroom—MTWThF 9–11:45 am. tutorial—MTWThF 12:45–1:35 pm, laboratory—MTWThF 1:45–2:35 pm.

103A **Intensive Readings in Modern Chinese** (6)

Intensive readings in selected modern literary works, social sciences, and documentary materials. Prerequisite: Chin 12 or equivalent. June 3 to July 5: MTWThF 9–11:45 am.

* Students may register for Chin 8B on June 3.

Classics

John E. Ziolkowski, *Chairman*

COURSES IN ENGLISH TRANSLATION

64A Greek and Latin Origins of English Words (3)

Study of Greek and Latin roots in English to improve vocabulary and facilitate understanding of the language of science, philosophy, politics, etc. Survey of the historical contact between Latin and English. First Session: MTWThF 9:40–11 am.

108B Classical Mythology (3)

Mythology of the Greeks and Romans from the creation of the world: tales of the gods, heroes, and great families that have influenced literature, art, and music. Second Session: MTWThF 9:40–11 am.

113A Greek and Roman Drama (3)

Selected masterpieces of Greek and Roman tragedy and comedy. First Session: MTWThF 11:10 am–12:30 pm.

170B Women in Classical Antiquity (3)

In-depth study and discussion of readings from ancient and modern sources on the role of women in Greek and Roman society. Second Session: MTWThF 11:10 am–12:30 pm.

Computer Science

See "Engineering and Applied Science."

Economics

Henry Solomon, *Chairman*

Departmental prerequisite: Econ 1–2 is prerequisite to all other courses in Economics except for Econ 217–18.

1–2 Principles of Economics (3–3)

Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1 is prerequisite to Econ 2. First Session: Econ 1 Section A—MTWThF 9:40–11 am, Section B—MTWTh 5:45–7:25 pm. Second Session: Econ 1 Section C—MTWThF 1:10–2:30 pm; Econ 2 Section B—MTWThF 1:10–2:30 pm, Section C—MTWTh 5:45–7:25 pm.

101A Intermediate Microeconomic Theory (3)

Analysis of supply, demand, and pricing. First Session: MTWThF 9:40–11 am.

102A Intermediate Macroeconomic Theory (3)

Theories of national income determination and growth. First Session: MTWThF 11:10 am–12:30 pm.

121B Money and Banking (3)

Nature of money, credit, commercial banking, and other financial institutions in the U.S. monetary system. Second Session: MTWTh 5:45–7:25 pm.

130A Comparative Economic Systems (3)

A critical exposition of fundamental economic concepts and theories of capitalism, communism, socialism, and fascism. First Session: MTW ThF 9:40–11 am.

181–82 International Economics (3–3)

Econ 181: international trade theory and international monetary theory. Econ 182: continuation of international monetary theory; economic development. First Session: Econ 181A—MTWThF 11:10 am–12:30 pm. Second Session: Econ 182B—MTWTh 5:45–7:25 pm.

202A History of Economic Thought (3)

Critical analysis and interpretation of the development of economic theory from the 17th century to the present. First Session: MWTh 6:10–8 pm.

203A Microeconomic Theory (3)

Demand and cost analyses. Prerequisite: Econ 101. An 8-week course, June 3 to July 26: MTh 6:10–8 pm.

217–18 Survey of Economics (3–3)

For graduate students in fields other than Economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived. First Session: Econ 217A—MWTh 6:10–8 pm; 218A TThF 9:10–11 am. Second Session: Econ 217B MWTh 9:10–11 am; 218B MWTh 6:10–8 pm.

299–300 Thesis Research (3–3)

Econ 299A and 300A: both sessions.

390A Seminar: International Economic Theory (3)

Limited to graduate students, primarily for doctoral students. Examination of recent contributions in this field. First Session: MWTh 6:10–8 pm.

398A Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A Dissertation Research (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Education

Donald Linkowski, *Chairman*

Departmental prerequisite: a degree from an accredited institution is prerequisite to all third-group courses in Education. Adequate professional preparation is prerequisite to all third-group courses in Education except for those courses limited to students in the M.A.T. degree program.

See also courses in Physical Education, Health, and Recreation, pages 101–3, and in Special Education, pages 115–18.

FIRST 3-WEEK WORKSHOP SESSION—JUNE 17 TO JULY 5

Except for Educ 152A and 332A, classes meet Monday through Friday. Each workshop course requires the full day; concurrent registration for another daytime course is not permitted.

112A **Educational Measurement** (3)

Scope, needs, services to students, selection and construction of teacher-made tests, interpretation of tests for evidence purposes. Prerequisite: Educ 108 and 123. June 17 to 21: lecture 3:45–5:45 pm. June 24 to July 5: lecture 10:10–12 am; conference 9:10–10 am.

*152A **Early Childhood Curriculum** (3)

Admission by permission of instructor. TTh 6:40–9 pm; conference 6–6:40 pm.

207A **Curriculum Materials** (3)

For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations. June 17 to 21: lecture 3:45–5:45 pm. June 24 to July 5: lecture 8:10–10 am; conference 10:10–11 am.

209A **Child Development** (3)

Interdisciplinary approach to child development and behavior. Practical implications of research in disciplines contributing to knowledge about childhood. June 17 to 21: lecture 3:45–5:45 pm. June 24 to July 5: lecture 10:10–12 am; conference 9:10–10 am.

219A **Elementary School Classroom Procedures** (3)

Current theories of teaching and learning and their application to teaching acts and strategies of elementary school teachers. June 17 to 21: lecture 3:45–5:45 pm. June 24 to July 5: lecture 10:10–12 am; conference 9:10–10 am.

223A **Foundations of Reading Instruction** (3)

Historical and psychological background; evaluation of recent methods, materials, and techniques in teaching reading; demonstrations of diagnostic and teaching techniques. June 17 to 21: lecture 3:45–6:45 pm. June 24 to July 5: lecture 9–12 am.

*week course, June 17 to July 26.

243A **Human Relations in Education** (3)
Principles and practices in human relations between and among learner, teacher, other school personnel, and parents. June 17 to July 5: lecture 6:10–8 pm; conference 5:10–6 pm.

245A **School and Community** (3)
The school as an important member of a team of social agencies that builds the community. June 17 to July 5: lecture 6:10–8 pm; conference 5:10–6 pm.

251A **Foundations of Guidance and Personnel Services** (3)
Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues. June 17 to July 5: lecture 3:45–5:45 pm; conference 6–6:50 pm.

255A **Secondary Education** (3)
Current proposals for improvement of secondary education. June 17 to 21: lecture 3:45–5:45 pm. June 24 to July 5: lecture 10:10–12 am; conference 9:10–10 am.

258A **Techniques of Counseling** (3)
Theories and practices of vocational, educational, and personal counseling. Prerequisite: 12 semester hours in guidance and counseling, including Educ 253 and 257. June 17 to July 5: lecture 4:10–6 pm; conference 6:10–7 pm.

316A **Curriculum Developments in Elementary School Social Studies** (3)
For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor. June 17 to July 5: lecture 3:45–5:45 pm; conference 6–6:50 pm.

*332A **Early Childhood Curriculum** (3)
Content, approaches, methods, and materials in language arts, mathematics, science, health, social studies, and creative arts. TTh 6:40–9 pm; conference 6–6:40 pm.

380A **Sensitivity Training: Laboratory Method** (3)
A sensitivity learning experience in human relations using unstructured group experience, individual feedback, experimentation, and practice. Admission by permission of Department, prior to registration. June 17 to 28: lecture and laboratory 9:10–12 am and 1:10–5 pm. July 1 to 5: individual projects as assigned and conference.

†Psyc 22A **Introduction to Educational Psychology** (3)
The contributions of psychology to education, with special emphasis on learning. June 17 to 21: lecture 3:45–5:45 pm. June 24 to July 5: lecture 10:10–12 am; conference 9:10–10 am.

SECOND 3-WEEK WORKSHOP SESSION—JULY 8 TO JULY 26

Classes meet Monday through Friday. Concurrent registration for another daytime course is not permitted, because each workshop course requires the full day—lecture and conference in the morning; small group discussion and field work in the afternoon.

* A 6-week course, June 17 to July 26.
† Students register in the Department of Psychology.

*115B **Elementary School Teaching of Reading** (3)

Introduction to methods, techniques, materials, and activities essential to a good elementary school reading program. Prerequisite: Educ 108 and 123, or teaching experience. Lecture 8:10–10 am; conference 10:10–11 am.

201B **Seminar: International Education** (3)

For teachers and other educators. Survey of selected foreign educational systems and cultures. Research, techniques, and materials to develop world-mindedness. Embassy resources utilized. Lecture 9:10–11 am; conference 11:10–12 am.

223B **Foundations of Reading Instruction** (3)

Historical and psychological background; evaluation of recent methods, materials, and techniques in teaching reading; demonstrations of diagnostic and teaching techniques. Lecture 10:10–12 am; conference 9:10–10 am.

253B **Analysis of the Individual for Purposes of Counseling** (3)

Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: Educ 112 or equivalent. Lecture 10:10–12 am; conference 9:10–10 am.

256B **Secondary Education** (3)

Current problems in each subject-matter field. Lecture 8:10–10 am; conference 10:10–11 am.

272B **The Teacher and School Supervision** (3)

Nature, organization, human relationships, and techniques. Lecture 10:10–12 am; conference 9:10–10 am.

285B **Student Activities** (3)

Nature and purposes of selected activities—homeroom, clubs, assemblies, school publications, student council, interscholastic contest; attention to sponsorship, participation, finance, and evaluation. Lecture 10:10–12 am; conference 9:10–10 am.

317B **Curriculum Developments in Elementary School Science** (3)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor. Lecture 8:10–10 am; conference 10:10–11 am.

341B **Cognitive Models and Instructions** (3)

Cognitive models (Guilford, Piaget, etc.) are analyzed as the theoretical basis for planning instructional episodes appropriate at various levels—childhood through young adulthood. Lecture 10:10–12 am; conference 9:10–10 am.

354B **Counseling of Minority Groups** (3)

Consideration of problems and approaches related to counseling cultural and racial minorities in American society; emphasis on counseling the disadvantaged in urban areas. Lecture 10:10–12 am; conference 9:10–10 am.

*Course may not be taken by students who have completed or plan to enroll in Educ 111.

373B **The Junior-Community College** (3)

The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges. Lecture 6:10–8 pm; conference 5:10–6 pm.

375B **Foundations of a College Student Development Program** (3)

College student development as an integral part of higher education programs. Lecture 9:10–12 am.

SIX-WEEK SESSION—JULY 8 TO AUGUST 16

108B **Human Development, Learning, and Teaching** (3)

Principles of effective teaching based on an understanding of human development and the nature of learning. Prerequisite: Psyc 22; Psyc 29 or 112. Lecture MW 6:40–9 pm; conference 6–6:40 pm.

112B **Educational Measurement** (3)

This special section of Educ 112 is limited to students in the M.A.T. in elementary education degree program. Scope, needs, services to students, selection and construction of teacher-made tests, interpretation of tests for evidence purposes. Prerequisite: Educ 108 and 123. As arranged.

123B **Society and the School** (3)

Historical and social development of education, contemporary issues, cooperation of the school with other community agencies, functions of school personnel. TTh 6:40–9 pm; conference 6–6:40 pm.

220B **Elementary School Teaching Foundations** (9)

Limited to students in the M.A.T. in elementary education degree program. Introductory block course dealing with the content of professional education courses: history and philosophy of education; educational psychology; human development, learning, and teaching; society and the school; elementary school organization. 160 class hours supplemented by field experience. MTWThF 9–12 am and 1–5 pm.

229B **Administration of Elementary Education** (3)

For experienced teachers and administrators. Achieving instructional objectives, organizing and servicing teaching activities, coordinating school and community life. TW 4:10–6 pm; two conference hours as arranged.

247B **Adult Occupational Education** (3)

Development, current concepts, agencies involved, problems, and trends in adult vocational-technical-occupational education in the United States and foreign countries. Lecture MW 6:40–9 pm; two conference hours as arranged.

261B **Practicum in Counseling** (3)

(Formerly Practicum in Guidance)

Intensive counseling experience under supervision. Emphasis on relationship dynamics, analysis, recommendations, and follow-up. Prerequisite: Educ 258. MTWThF 1–3 pm.

271B **The Teacher and School Administration** (3)

Role of federal, state, and local administrative units; school finance; legal

controls; school plant; public support; improving teaching conditions. TW 6:40–9 pm; two conference hours as arranged.

293–94 **Research and Independent Study** (3–3)

Individual research under guidance of a staff member. Program and conferences arranged with an instructor. Educ 293B and 294B.

295 **Quantitative Methods II: Research Procedures** (3)

(Formerly Research Methods and Procedures)

Required of all candidates for graduate degrees in Education. Analysis of scientific approaches to problems in education; evaluation of research techniques. Prerequisite: Educ 212 or equivalent. Section B: TTh 1:10–3 pm; two conference hours as arranged. Section C: TTh 5:30–7:20 pm; two conference hours as arranged. Section D: MW 6:40–9 pm; two conference hours as arranged.

99–300 **Thesis Research** (3–3)

Required of Master of Arts in Education candidates writing Master's theses. Educ 299A and 300A.

306B **Quantitative Methods IV: Advanced Research Design** (3)

(Formerly Educ 296 Seminar: Educational Research)

Required of all doctoral students in Education. Evaluation and application of educational research designs. Prerequisite: Educ 302 or equivalent. MW 6:40–9 pm; two conference hours as arranged.

385B **Collective Negotiations in Higher Education** (3)

Theory, practice, problems, and issues in collective negotiations in higher education. TTh 6:40–9 pm; two conference hours as arranged.

388B **Case Studies in Higher Education Administration** (3)

Limited to advanced doctoral students in Education. Analysis of selected hypothetical cases related to essential administrative functions of colleges and universities. Admission by permission of instructor. MW 6:40–9 pm; two conference hours as arranged.

490B **Pre-dissertation Seminar** (3)

(Formerly Dissertation Seminar)

Required of all Ed.D. degree candidates. Approval of the dissertation prospectus is necessary for successful completion of the seminar. MW 6:40–9 pm; two conference hours as arranged.

D 3-WEEK WORKSHOP SESSION—JULY 29 TO AUGUST 16

es meet Monday through Friday. Concurrent registration for another day-course is not permitted, because each workshop course requires the full -lecture and conference in the morning; small group discussion and field or laboratory in the afternoon.

28C **Children's Literature** (3)

Newer books for children and the children's classics, contribution of literature to child development, children's original expressions. Lecture 8:10–10 am; conference 10:10–11 am.

02C **Seminar: International Education** (3)

For teachers and other educators. Survey of selected foreign educational systems and cultures. Research, techniques, and materials to develop

world-mindedness. Embassy resources utilized. Lecture 9:10–11 am; conference 11:10–12 am.

208C **Human Development** (3)

Consideration of human development and behavior throughout the life span; emphasis on practical implications of relevant interdisciplinary research. Lecture 10:10–12 am; conference 9:10–10 am.

231C **Secondary School Classroom Procedures** (3)

Current classroom practices: teacher-pupil planning, group procedures, initiatory and culminating activities, individual and group evaluation techniques, teaching aids, etc.; review of recent literature. Lecture 8:10–10 am; conference 10:10–11 am.

257C **Educational and Occupational Development** (3)

Theories of career development; factors influencing the world of work; procedures for evaluating and using socio-personal, educational, and occupational information. Lecture 4:10–6 pm; conference 6–6:50 pm.

260C **Secondary School Supervision** (3)

For experienced teachers and administrators. Review of modern supervisory concepts, including practices in schools. Lecture 10:10–12 am; conference 9:10–10 am.

320C **Curriculum Developments in Elementary School Mathematics** (3)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor. Lecture 8:10–10 am; conference 10:10–11 am.

342C **Language Development** (3)

Nature of language development; role of language in the socialization process. Lecture 10:10–12 am; conference 9:10–10 am.

357C **Mental Hygiene** (3)

Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents. Lecture 10:10–12 am; conference 9:10–10 am.

376C **College Student Development and Campus Groups** (3)

Principles and procedures of student development programs with campus groups; campus group activities and development of student leadership. Lecture 9:10–12 am.

For information concerning special programs and workshops of interest to teachers, see pages 37–51.

Electrical Engineering

See "Engineering and Applied Science."

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PPLIED SCIENCE

p S 57, 58, and 113 are administered by the Department of Civil, Mechani-, and Environmental Engineering, A.M. Freudenthal, *Chairman*.
p S 115 is administered by the Department of Operations Research, W.H. arlow, *Chairman*.

57A Analytical Mechanics I (2)

First half of a one-year sequence. Concepts of statics, including force systems, equilibrium conditions, simple structures, distributed forces, shear and moments, friction and the concept of work, virtual work and stability. Prerequisite or concurrent registration: Ap S 44 or equivalent, Phys 2. First Session: MWF 4:10–5:45 pm.

58B Analytical Mechanics II (3)

Second half of a one-year sequence. Concepts of dynamics, including kinematics of particles, velocity and acceleration, Newton's laws of motion, momentum, work, kinetic energy, potential energy, central force fields, vibrations, resonance, dynamics of systems of particles, kinematics of a rigid body, dynamics of a rigid body. Introduction to Lagrangian-Hamiltonian formulation. Prerequisite: Ap S 45 or equivalent, Ap S 57. Second Session: MTWTh 5:45–7:25 pm.

113A Engineering Analysis I (3)

Analytical methods appropriate to the solution of engineering problems. Mathematical topics include matrices and linear algebra; ordinary differential equations, vector calculus, and integral theorems; complex algebra. Prerequisite: Math 32. First Session: MTWTh 5:45–7:25 pm.

15A Probabilistic and Statistical Methods in Engineering (3)

Solution of engineering problems using sets and functions; probability models; distributions and functions; statistical concepts and methods, including hypothesis testing, correlation, and regression. Prerequisite: Math 32. A 7-week course, June 3 to July 22: MTh 6:10–8:40 pm.

PUTER SCIENCE

nistered by the Department of Electrical Engineering and Computer Sci-W.K. Kahn, *Chairman*

-WEEK COURSES—JUNE 3 TO JULY 22

1A Introduction to Computer Systems I (3)

Introduction to programming of digital computers in a macro-assembly

language and higher-level procedural languages; techniques in machine control and memory addressing; data structures, list and string processing in data processing; characteristics and choice of data processing language; introduction to PL/1 language; sorting, searching, and merging of data. Prerequisite: EE 51 or equivalent; or permission of instructor. TTh 6:10–8:40 pm.

202A **Introduction to Computer Systems II** (3)

Introduction to combinational and sequential logic networks; analysis and synthesis of switching circuits using Boolean algebra; minimization techniques in the design of logical circuits; number systems and arithmetic in digital computers, digital computer architecture and the design of functional sub-units; design of memory, arithmetic, and units comprising a digital computer; information flow, timing, and control in large digital computers. Prerequisite: CS 201 or permission of instructor. MW 6:10–8:40 pm.

298A **Research** (arr.)

Research as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

CS 299A and 300A.

399A **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

ELECTRICAL ENGINEERING

Administered by the Department of Electrical Engineering and Computer Science, W.K. Kahn, *Chairman*

SEVEN-WEEK COURSES—JUNE 3 TO JULY 22

51A **Applications of Computers** (3)

Solution of problems on digital computers, using FORTRAN, data processing, and numerical methods. Writing, debugging, and running programs on a digital computer. MW 3:10–5:40 pm.

153A **Design of Switching Systems** (3)

Switching algebra and Boolean logic; analysis and design of switching devices; design of combinational and sequential logic networks; minimization techniques and their use in logic design; electronic implementation of logic; number systems and codes, geometric interpretation, error-correcting codes; encoding and decoding; logic and electronic design of functional digital units. Prerequisite: EE 152 or permission of instructor. May be taken for graduate credit. TTh 6:10–8:40 pm.

154A **Digital Computer Design** (3)

Logic and electronic design of functional digital units, design of computer subsystems, flow of information and logical flow diagrams in timing and control; design of memory, arithmetic, and I/0 units; binary and decimal machine arithmetic; design of a digital computer. Prerequisite or concurrent registration: EE 153 or permission of instructor. May be taken for graduate credit. TTh 3:10–5:40 pm.

157A **Machine and Assembly Language Programming** (3)

Machine and assembly language programming in fixed and variable word-length computers; techniques in addressing and machine control; data structures and data processing; use of subroutine linkages; co-routines, pushdown lists, list processing, loops and input-output subroutines; use of a macro-assembly language; sorting, merging, arrays, and data fields in data processing. Prerequisite: EE 152 or equivalent, or permission of instructor. May be taken for graduate credit. TTh 3:10–5:40 pm.

198A **Research** (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. As arranged.

204A **Stochastic Signals and Noise** (3)

Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear mean squared estimation; stationary estimation, stationary random processes, correlation functions, power spectrum; output of linear systems with stochastic inputs; Gaussian processes. Applications drawn for communications, control theory, computer science. TTh 6:10–8:40 pm.

284A **Introduction to Medicine for Engineers II: Clinical Medicine** (3)

Clinical aspects of medicine. Further elaboration of physiological systems, such as the endocrine system, renal physiology, gastrointestinal physiology, and others; the separate systems of the body are integrated to present the functioning of the body as an over-all system; considerable interaction with physicians and other medical personnel. Prerequisite: EE 283. TTh 3:10–5:40 pm.

298A **Research** (arr.)

Research as arranged. May be repeated for credit.

-300 **Thesis Research** (3–3)

EE 299A and 300A.

399A **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

INEERING ADMINISTRATION

Crafton, *Chairman*

N-WEEK COURSES—JUNE 3 TO JULY 22

50A **Introduction to Technical Management** (3)

The interrelationships of engineering, science, and management; conceptual foundations for interaction of human factors in individuals, groups, and the social environment of engineering activities. Familiarization with typical activities of engineering managers and with factors bearing on the motivation of engineers and on engineers as managers. Social and organizational factors relevant to the management of engineers. This course is preliminary to the complete management process studied in E Ad 211–12. MW 6:10–8:40 pm.

70A **Basic Quantitative Methods for Engineering Administration** (3)

An introductory treatment of quantitative tools and techniques important in administration, emphasis on their application. Concepts of probability and decision-making in administrative decisions. TTh 6:10–8:40 pm.

211–12 **Engineering Administration** (3–3)

Comprehensve and systematic study of the administrative process; emphasis on industrial, scientific, and engineering environments. Planning: objectives, prediction, policies, plans and characteristics of plans. Organizing: theory of organization, structure, authority, specialization, delegation, staff and committees. Directing: leadership, managing human and material resources. Controlling: setting standards, evaluating performance, using system feedback data for correction and improvement. E Ad 211A: MW 3:10–5:40 pm; E Ad 212A: TTh 3:10–5:40 pm.

269A **Elements of Decision-making and Problem-solving** (3)

History and orientation of quantitative methods; concept of quantitative decision-making; decision criteria under certainty, risk, and uncertainty; game theory; utility; the time factor; replacement models. Prerequisite: E Ad 170 or equivalent. MW 3:10–5:40 pm.

297A **Problems in Engineering Administration** (3)

Project course providing the student with the opportunity to apply the various concepts and tools previously studied to the solution of a problem in engineering administration. Students work individually or in small groups, each on a problem proposed by the student and approved by the instructor. MW 3:10–5:40 pm.

298A **Research** (3)

Basic or applied research in engineering administration or systems analysis. May be repeated for credit.

MECHANICAL ENGINEERING

Administered by the Department of Civil, Mechanical, and Environmental Engineering, A.M. Freudenthal, *Chairman*

131B **Thermodynamics** (3)

Fundamental thermodynamic concepts, Zeroth law of thermodynamics and temperature measurements, work and heat, first law of thermodynamics, properties of pure substances, first-law analysis of some thermodynamic systems, second law of thermodynamics, reversibility, entropy, second-law analysis of thermodynamic systems. Prerequisite or concurrent registration: Ap S 59. Second Session: MTWTh 5:45–7:25 pm.

OPERATIONS RESEARCH

W.H. Marlow, *Chairman*

SEVEN-WEEK COURSES—JUNE 3 TO JULY 22

201A **Survey of Operations Research Methods I** (3)

Basic concepts and techniques of operations research as applied to problems in industrial, governmental, and military decision-making. Allocation models including the simplex procedure of linear programming, transportation and assignment models, queuing theory, inventory theory, game theory, and decision-making under uncertainty. Prerequisite: Ap S 115 or equivalent. TTh 3:10–5:40 pm.

202A **Survey of Operations Research Methods II** (3)

Simulation, Monte Carlo techniques; networks; integer programming; introduction to nonlinear programming; dynamic programming; Markov chains; reliability and replacement. Prerequisite: OR 201 or equivalent. MW 3:10–5:40 pm.

English

G.E. McCandlish, *Chairman*

Students whose College Board English Composition Achievement Test scores suggest inadequate preparation may be assigned to Engl 9 or may be tested in vocabulary, spelling, grammar, standard usage, and writing skill, before placement in either Engl 9 or 10. Students whose scores and/or writing skill indicate superior competence will be allowed to waive Engl 10; those whose scores indicate markedly superior competence will be allowed to waive both Engl 10 and Engl 11 or 12.

Departmental prerequisite: Engl 9 or 10 is prerequisite to all other courses in English. A 6-semester-hour course in literature, or equivalent, or written permission of the instructor, is prerequisite for admission to all second-group courses in English except Engl 115 and 161–62.

ENGLISH COMPOSITION

3A **English for Foreign Students** (3)
(Formerly Engl A)

Reading and writing to assist the foreign student in overcoming deficiencies in the use of English. Special attention to spelling, syntax, grammar, idiom, and vocabulary. First Session: MTWTh 5:45–7:25 pm.

5A **English for Foreign Students** (3)
(Formerly Engl B)

For second-semester foreign students not ready for Engl 10. Writing of expository paragraphs and themes; outlining; reading for comprehension, vocabulary, and style. First Session: MTWTh 7:35–9:15 pm.

10A **English Composition: Language as Communication** (3)
(Formerly Engl 1)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure. First Session: MTWThF 11:10 am–12:30 pm.

11B **English Composition: Language and the Arts and Sciences** (3)
(Formerly Engl 2)

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected readings on the nature of language and of the arts and sciences. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 11 cannot receive credit for Engl 12. Second Session: MTWThF 11:10 am–12:30 pm.

12B **English Composition: Language in Literature** (3)
(Formerly Engl 4)

Study and practice of expository and argumentative techniques through critical writing; emphasis on the rhetorical complexities of stylistics in the sentence and in diction, and on logical thought, by the study of literary genres and of the use of language in literature. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 12 cannot receive credit for Engl 11. Second Session: MTWThF 11:10 am–12:30 pm.

*101B **Expository Writing** (3)

Types of expository writing; weekly exercises on students' needs. Prerequisite: Engl 9 or 10; 11 or 12. August 10 through November 16. As arranged.

ENGLISH LITERATURE

51–52 **Introduction to English Literature** (3–3)

Representative works by major authors, studied in their historical context; discussion of recurrent themes, and introduction to various types and forms of imaginative literature. Engl 51: Middle Ages to 18th century. Engl 52: 19th and 20th centuries. First Session: Engl 51A. Second Session: Engl 52B. MTWThF 9:40–11 am.

111B **Medieval English Literature—Exclusive of Chaucer** (3)

Second Session: MTWTh 5:45–7:25 pm.

129B **The Earlier 17th Century** (3)

Verse of Shakespeare, Jonson, Donne, Herrick, Herbert, Vaughan, and Marvell, and the earlier verse of Milton. Second Session: MTWThF 4:10–5:30 pm.

137B **The 20th Century** (3)

Literature since 1900. Poetry and criticism. Second Session: MTW ThF 11:10 am–12:30 pm.

145A **Special Topics in English Literature** (3)

Topic for summer: the English essay from Bacon to Eliot. First Session: MTWThF 1:10–2:30 pm.

151A **19th Century British Poetry** (3)

Readings in Wordsworth, Keats, Browning, and Swinburne. First Session: MTWThF 11:10 am–12:30 pm.

157A **20th Century Drama** (3)

Representative continental, English, and American plays of the 20th century. First Session: MTWThF 4:10–5:30 pm.

158B **20th Century British Prose Fiction** (3)

Second Session: MTWThF 9:40–11 am.

229A **Studies in English Literature, 1600–1660** (3)

Chief figures exclusive of Milton. First Session: MWTh 6:10–8 pm.

* Limited to candidates in the Bachelor of Science in Health Care Administration degree program offered at the Naval School of Hospital Administration, Bethesda, Md.

AMERICAN LITERATURE

71–72 Introduction to American Literature (3–3)

Historical survey. Engl 71: from beginnings to the Civil War. Engl 72: from the Civil War to present. First Session: Engl 71A: Second Session: Engl 72B. MTWTh 5:45–7:25 pm.

164A Major American Poets (3)

Advanced critical study of significant writers and movements in the 20th century. First Session: MTWTh 5:45–7:25 pm.

168B The American Novel (3)

Historical and critical study of significant novels of the 20th century. Second Session: MTWTh 5:45–7:25 pm.

170B The American Short Story (3)

Historical development of the short story in America. Second Session: MTWThF 1:10–2:30 pm.

172A Major American Writers (3)

Melville, Faulkner, Bellows. Man's search for meaning. First Session: MTWThF 9:40–11 am.

174B Selected Literary Movements (3)

Realism in American literature, 1865–1905. Second Session: MTWThF 4:10–5:30 pm.

176A Special Topics in American Literature (3)

Topic for summer: pessimism in 20th century American Literature—Twain, Hemingway, Fitzgerald, Wolfe, Hart Crane, Eliot, Tate, and others. First Session: MTWThF 1:10–2:30 pm.

177–78 Contemporary American Literature (3–3)

First Session: Engl 177A; Second Session: Engl 178B. MTWThF 11:10 am–12:30 pm.

Experimental Humanities

dministered by the Division of Experimental Programs, C.C. Mondale, *Director*

XPERIMENTAL HUMANITIES

101–2 Supervised Field-Study (3–3)

Community-based projects supervised by appropriate faculty. Juniors and seniors admitted by permission of instructor. Prerequisite to Hum 102: Hum 101. First Session: Hum 101A and 102A; Second Session: Hum 101B and 102B. As arranged.

181A **Oral History Institute** (3)

First Session: MTWThF 9:40–11 am. (See Oral History Institute, pages 44–45.)

197A **Workshop on the Politics of the Information Process** (3)

First Session: MTWThF 9:40–11 am. (See Workshop on the Politics of the Information Process, pages 50–51.)

SERVICE-LEARNING EXPERIMENTAL HUMANITIES

150 **Learning through Service** (3)

Open only to juniors and seniors. Students undertake an assignment with an off-campus agency or group. Arrangements are made through a "contractual" agreement among the student, the agency or group, and the Service-Learning Program. First Session: Section A; Second Session: Section B. As arranged.

For information concerning the Oral History Institute and the Workshop on the Politics of the Information Process, see pages 44–45, 50–51.

Forensic Sciences

R.C. Allen, *Chairman*

214B **Forensic Psychiatry** (3)

Introduction to the constructs of dynamic psychiatry, psychiatric evolution, and the nomenclature of mental disorders. Consideration of expert testimony, direct examination and cross-examination in hospitalization and criminal cases. Second Session: TTh 5:30–7:30 pm.

220 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (3)
(Formerly ForS 205 Survey of Forensic Science (3) and ForS 226 The Crime Lab, the Forensic Scientist, and the Criminal Lawyer (3))

Survey of the forensic physical sciences; qualifications and preparation of the expert witness and his role in court in criminal and civil cases; operation and function of the crime lab. First Session: Section A; Second Session: Section B. MW 7:30–9:30 pm.

*227 **Advanced Criminal Procedure** (3)

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Prerequisite: ForS 224 or equivalent. First Session: Section A—MW 5:30–7:30 pm. Second Session: Section B—TTh 7:30–9:30 pm.

* In special circumstances, students may take a similar course in the National Law Center with the prior approval of the Dean of the National Law Center.

254A **Seminar: Selected Topics in the Forensic Sciences** (3)
(Formerly Seminar: Recent Developments in Forensic Science (2))
Exploration of selected current issues in research, investigation, and law. First Session: TTh 5:30–7:30 pm.

264 **Medical Jurisprudence** (3)
Legal problems inherent in the practice of medicine. Laws regulating health personnel and health industry. Emphasis on professional liability. First Session: Section A—TTh 3–5 pm. Second Session: Section B—MW 9–11 am.

268 **Photography in the Forensic Sciences** (3)
Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. First Session: Section A—TTh 7:30–9:30 pm. Second Session: Section B—MW 5:30–7:30 pm.

295 **Research** (3)
Open to qualified Master's degree students. Research on problems, approved by the Chairman of the Department or academic adviser, under the supervision of an appropriate staff member. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)
ForS 299A and 300A: both sessions.

French

dministered by the Department of Romance Languages and Literatures,
F. Burks, *Chairman*

lacement Examination: A student who has not been granted advanced standg and who wishes to continue in college the language begun in high school ust take a placement examination before registration. Upon completion of e examination, assignment is made to the appropriate course.

epartmental prerequisite: Fren 3–4 or 6, or equivalent, is prerequisite to all cond-group courses in French

1–2 **First-year French** (3–3)
A year course: credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern French prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a session. First Session: Fren 1A; Second Session: Fren 2B. Classroom—MTWThF 9:40–11 am, laboratory—MTh 11:10–12 am.

3–4 **Second-year French** (3–3)
A year course: credit toward a degree at this University given on completion of Fren 4. Conversation, grammar, composition, reading in modern French prose, introduction to French civilization. Aural training, oral practice in language laboratory. Prerequisite: Fren 1–2 or two years of high school French. Laboratory fee, $17.50 a session. First Session:

Fren 3A; Second Session: Fren 4B. Classroom—MTWThF 11:10 am–12:30 pm, laboratory—MTh 10:10–11 am.

9A Expression orale du français contemporain (3)

Emphasis on conversation in a controlled situation. Special attention to the acquisition and active use of a flexible vocabulary. Oral reports. Prerequisite: Fren 4 or equivalent. First Session: MTWThF 9:40–11 am.

10B Cours de Syntaxe (3)

Grammar, writing of exercises, compositions and translation. Analysis of vocabularly and syntax and their effects in samples of writing. Prerequisite: Fren 4 or equivalent. Second Session: MTWThF 9:40–11 am.

49A French for Graduate Students (0)

For graduate students preparing for reading examinations. No academic credit. Tuition fee, $270. First Session: MTWThF 6–7:20 pm.

151A Cinema and Literature—in English (3)

Topic for summer: Surrealism. Interaction between the film and literature; aesthetic theories of the surrealists, and their applications to the film and literary genres. Selected films and readings. May be repeated for credit. First Session: MTh 4:10–5:30 pm; TW 4:10–6 pm.

Geography and Regional Science

M.F. Gordon, *Chairman*

51A Introduction to Geography (3)

General survey of the systematic fields of human geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts. First Session: MTWThF 9:40–11 am.

125A Transportation Geography (3)

Consideration of the spatial aspects of interaction, diffusion, and information transfer, including nodal activity and hierarchies, network geometry, gravity models, and diffusion processes. First Session: MTWThF 11:10 am–12:30 pm.

133B Geography of Poverty and Hunger (3)

Consideration of the locational aspects and correlates of poverty and hunger; rural and urban poverty regions; regional food budgets and taboos; programs concerned with the elimination of poverty and hunger. Second Session: MTWThF 11:10 am–12:30 pm.

140B Urban Geography (3)

Analysis of the internal spatial structure of cities; emphasis on explaining patterns of location within the city. Second Session: MTWThF 9:40–11 am.

155A Africa (3)

First Session: MTWThF 9:40–11 am.

189–90 **Readings in Geography** (arr.)

First Session: Geog 189A and 190A; Second Session: Geog 189B and 190B.

215A **Field Methods in Cultural Ecology: Pre-Columbian Settlement Patterns in the Tehuacan Valley** (6)

June 3 to 30. (See Field Program in Pre-Columbian Cultural Ecology, page 42.)

295 **Research** (arr.)

May be repeated once for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Geog 299A and 300A: both sessions.

For information concerning the Field Program in Pre-Columbian Cultural Ecology, see page 42.

Geology

Geza Teleki, *Chairman*

1–2 **Introductory Geology** (3–3)

Survey covering the principles of geology; emphasis on man's effect on the environment. Laboratory fee, $12 each session. First Session: Geol 1A; Second Session: Geol 2B. MTWTh 9:40 am–12:30 pm.

5B **Environmental Geology** (3)

The relation of man and society to natural environment; population evolution and resources; economic, legal, and political aspects. Second Session: TWTh 1:10–3:30 pm.

147A **Chemical Geology in the Earth and Ocean Sciences** (3)

Introduction to geochemical and chemical principles involved in geological systems and their application to contemporary problems in oceanology, pollution, and mineral exploration. Laboratory fee, $12. First Session: MTWTh 9:40 am–12:15 pm.

295 **Research** (arr.)

Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

First Session: Geol 299A; Second Session: Geol 300A.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Germanic Languages and Literatures

Carl Steiner, *Chairman*

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 First-year German (3–3)

Fundamental concepts of German culture, essentials of German structure and basic vocabulary, reading of easy prose and conversation. Aural-oral practice in language laboratory. Prerequisite to Germ 2: Germ 1 or equivalent. Laboratory fee, $17.50 each session. First Session: Germ 1A; Second Session: Germ 2B. Classroom: MTWTh 5:45–7:25 pm. Laboratory: Section M—MTh 4:45–5:35 pm; Section N—MTh 7:35–8:25 pm.

3–4 Second-year German (3–3)

Introduction to German civilization, selections from modern German prose, continuation and review of German structure, conversation and simple composition. Aural-oral practice in language laboratory. Prerequisite to Germ 3: Germ 2 or equivalent. Prerequisite to Germ 4: Germ 3 or equivalent. Laboratory fee, $17.50 each session. First Session: Germ 3A; Second Session: Germ 4B. Classroom: MTWTh 7:35–9:15 pm. Laboratory: Section M—MTh 4:45–5:35 pm; Section N—MTh 6:30–7:20 pm.

47A Beginning German for Reading Acquisition (3)
(Formerly Beginning German for Reading Examination Candidates (0))

For undergraduates and graduate students with little or no German who are interested in acquiring a reading knowledge of German. No academic credit for graduate students. First Session: MTWTh 5:45–7:25 pm.

49B German Readings for Nonmajor Students (3)

Primarily for graduate students preparing for reading examinations: undergraduates admitted. No academic credit for graduate students. Prerequisite: Germ 4 or 47, or equivalent. Second Session: MTWTh 5:45–7:25 pm.

Health Care Administration

Leon Gintzig, *Chairman*

*110B **Introduction to Health Care Planning** (3)

Introduction to health care program and facility planning. Emphasis on the role and function of planning agencies, estimation of needs, assessment of community and facility resources, collection of data, and evaluation of program and facility design. August 10 through November 16: As arranged.

*120B **Personnel Relations in Health Care Institutions** (3)

Introduction to personnel relations in the health care environment. Research studies, as they pertain to the concepts of leadership and superior-subordinate relations in a multidisciplinary organization, evaluated for practical application. Emphasis on employee cooperation, differences in ability and background, and problems caused by specific working conditions. August 10 through November 16: As arranged.

*153B **Survey of Health Care Organization** (3)

Introduction to the organization and delivery of health care services in the United States. Emphasis on the structural features of and the resources available to the health care system. August 10 through November 16: As arranged.

204A **Management of Health Maintenance Organizations** (3)

Basic principles and fundamentals of prepaid group practice plans and newly forming health maintenance organizations. Emphasis on planning, development, and operation of prepaid plans. June 3 through August 16: MWF 1–3 pm.

210A **Advanced Financial Management of Health Care Institutions** (3)

Nature and interpretation of health care institution financial reports. Techniques of financial planning and control; operation of third-party reimbursement contracts; capital needs, planning, and acquisition; case studies, field research. Prerequisite: HCA 209. June 3 through August 16: T 3–5 pm.

215A **Practicum in Health Project Planning** (3)

Supervised practical instruction in agencies doing comprehensive health planning; emphasis on basic investigation and problem-solving techniques, including various methods of collecting, analyzing, and reporting data. Prerequisite: HCA 212. June 3 through August 16.

270A **Research in Health Care Administration** (3)

Field research. Primarily for doctoral students; open to other graduate students with consent of instructor. May be repeated for credit. June 3 through August 16.

285A **Readings in Health Care Administration** (3)

Supervised readings in special areas or subdivisions of health care administration and planning. Primarily for doctoral students; open to other students by arrangement. June 3 through August 16.

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*mited to students in the Bachelor of Science in Health Care Administration degree program he Naval School of Hospital Administration, Bethesda, Md.

288A **Seminar: Field Problem Studies in Health Care Administration** (3)

Selected administrative and planning issues and problems arising in health care facility situations. Primarily for doctoral students; open to other students by arrangement. May be repeated for credit. June 3 through August 16.

293 **Residency I** (3)

First third of the twelve-month residency. Work experience under a qualified preceptor, periodic written progress reports, and a written major report or field projects. Sections A, B, C, and D. June 3 through August 16.

296A **Residency II** (3)

First third of twelve-month residency. For selected students who take a second year of residency. June 3 through August 16.

History

R.W. Kenny, *Chairman*

Departmental prerequisite: Hist 39–40 or former 91–92 is prerequisite to courses 108 through 158 and 187 through 196; Hist 71–72, to courses 167 through 186; either Hist 39–40, 71–72, or former 91–92, to courses 161 through 166. Prerequisite to Hist 105–6 is either Hist 39–40, former 91–92, or a background in a science. Students may waive one or more of the prerequisite courses by passing a departmental waiver examination, by attaining scores of 600 or above on the College Entrance Examination Board Achievement Tests, or by good performance on Advanced Placement Examinations.

Prerequisite to all third-group and fourth-group History courses: the appropriate second-group preparation and consent of instructor. Fourth-group History courses are limited to graduate students; but they are primarily for doctoral students.

39–40 **European Civilization in Its World Context** (3–3)

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present. First Session: Hist 39A; Second Session: Hist 40B. MTWThF 9:40–11 am.

71–72 **Introduction to American History** (3–3)

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from 1492 to 1861. Hist 72: from 1861 to present. First Session: Hist 71A—MTWThF 11:10 am–12:30 pm; Hist 72A—MTWThF 1:10–2:30 pm. Second Session: Hist 71B—MTWThF 11:10 am–12:30 pm; Hist 72B—MTWThF 1:10–2:30 pm.

110A **The Roman World to 337 A.D.** (3)

Prehistoric Italy; rise and decline of the Roman Empire and Latin civilization; cultural, social, and political developments in the Greek world under Roman rule. First Session: MTWThF 1:10–2:30 pm.

*127A **Theories of History** (3)

Critiques of philosophies of history: idea of progress, historicism, Hegelian-Marxian dialectic, cyclical and social-scientific views. Contemporary problems of historical knowledge. First Session: MTWThF 11:10 am–12:30 pm.

140A **World History in the 20th Century** (3)

Diplomatic, political, and cultural factors from the Munich settlement to the present. First Session: MTWThF 9:40–11 am.

145A **History of Russia: 18th and 19th Centuries** (3)

First Session: MTWThF 11:10 am–12:30 pm. (See Russian-East Asian Studies program, pages 45–47.)

151–52 **History of England and Great Britain** (3–3)

Development of English civilization and its impact on Western culture. Hist 151: to 1689. Hist 152: since 1689. First Session: Hist 151A—MTWThF 1:10–2:30 pm. Second Session: Hist 152B—MTWThF 11:10 am–12:30 pm.

164B **History of Latin America** (3)

Political, socioeconomic, and cultural development in the national period. Second Session: MTWThF 9:40–11 am.

178A **Recent U.S. History** (3)

Political, social, and intellectual history from 1890 to present. First Session: MTWThF 9:40–11 am.

182A **U.S. Diplomatic History** (3)

Survey of American foreign relations in the 20th century. First Session: MTWThF 8:10–9:30 am.

187B **History of Modern China** (3)

Second Session: MTWThF 1:10–2:30 pm. (See Russian-East Asian Studies program, pages 45–47.)

188A **History of Chinese Communism** (3)

First Session: MTWThF 6–7:20 pm. (See Russian-East Asian Studies program, pages 45–47.)

203–4 **Research Seminar** (3–3)

Prerequisite: approval of Department. First Session: Hist 203A; Second Session: Hist 204B. As arranged.

214A **Evolution of the Socialist Commonwealth** (3)

First Session: MW 6–8:40 pm. (See Russian-East Asian Studies program, pages 45–47.)

225A **History of Washington, D.C.** (3)

First Session: TTh 6:10–8 pm; field trips as arranged. (See Capital City Historical Seminar, page 39.)

237A **Seminar: Soviet Foreign Policy, 1917–1953** (3)

First Session: TTh 6–8:40 pm. (See Russian-East Asian Studies program, pages 45–47.)

* interdepartmental course offered by the departments of History and Philosophy.

242B **Research Seminar: Modern European History** (3)
Prerequisite: appropriate preparation and consent of instructor. Second Session: TTh 1:10–3 pm.

248A **Reading Seminar: Modern European and Near Eastern History** (3)
Admission by permission of instructor. First Session: TTh 11:10 am–1 pm.

278A **Research Seminar: American History** (3)
Admission by permission of instructor. First Session: MW 11:10 am–1 pm.

299–300 **Thesis Research** (3–3)
Hist 299A and 300A: both sessions.

387A **Readings in the History of Sino-Soviet Relations** (3)
First Session: MWF 8:10–10 pm. (See Russian-East Asian Studies program, pages 45–47.)

396B **Readings in Modern Far Eastern History** (3)
Second Session: MWTh 6:10–8 pm. (See Russian-East Asian Studies program, pages 45–47.)

398A **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

For information concerning the Capital City Historical Seminar and the special program in Russian-East Asian Studies, see pages 45–47.

Institute for Sino-Soviet Studies

For information concerning the Russian-East Asian Studies program, see pages 45–47.

Journalism

R.C. Willson, *Chairman*

72A **Introduction to Mass Communication** (3)
Mass media, problems of contemporary journalism, emphasis on media-government relations. First Session: MTWThF 9:40–11 am.

111A **Reporting** (3)

Gathering, evaluating, and writing news. Laboratory fee, $5. First Session: MTWThF 9:40–11 am.

150A **News Coverage in Washington** (3)

A survey of the way news is gathered and reported in the nation's capital by wire services, newspaper bureaus, and the local dailies. Field trips to major news centers; practice coverage. First Session: MTWThF 11:10 am–12:30 pm.

160A **The New Journalism** (3)

First Session: MTWThF 11:10 am–12:30 pm. (See The New Journalism program, page 44.)

190A **Internship in Journalism** (3)

Study of a journalistic medium in action by assignment to a Washington area news office. Admission restricted to Journalism majors selected by a departmental committee. First Session: As arranged.

196A **Senior Project** (3)

Open only to Journalism majors. Major journalistic effort undertaken in consultation with a member of the Journalism staff. A written request describing the project must be presented to the staff member for approval, and filed with the student's adviser in the semester before registration. First Session: As arranged.

For information concerning The New Journalism program, see page 44.

Law

A list of courses to be offered during the summer of 1974 at the National Law Center will be available in a Law Center announcement scheduled to be issued during January 1974. Copies of this announcement may be obtained from the National Law Center.

Management Science

J.K. Winslow, *Chairman*

118A **Introduction to Information Processing** (3)

Basic principles and methods. A management-oriented introduction to the fundamentals, potentials, and problems of computer-based data processing as a tool for record-keeping, resource-controlling, and decision-making. First Session: MTWTh 4:10–5:50 pm.

119B Computer Programming for Information Systems (3)

Programming concepts, techniques, and practices. Introduction to the concepts and techniques of computer programming using the FORTRAN and COBOL languages. Emphasis placed on development and understanding of the logic necessary to solve business data processing and management science problems on a third generation digital computer. Student programs are run on the University's IBM 370 computer. Prerequisite: Mgt 118. Second Session: MWF 6:10–8 pm.

***201 Advanced Administrative Management** (3)

Principles and practices common to administrative units of all kinds. First Session: Section A—MWF 4:10–6 pm; Section B—MWF 8:10–10 pm. Second Session: Section C—MWF 6:10–8 pm.

203A Mathematics for Management (3)

Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus, and linear algebra to optimization problems. Prerequisite: algebra. First Session: MWF 4:10–6 pm.

204 Quantitative Factors in Administration (3)

Survey of quantitative techniques used in the solution of management problems. Potentials and limitations of mathematical models and proper areas for their application. Topics include probability, statistical decision theory, linear programming, waiting line, inventory replacement models. First Session: Section A—MWF 10:10–12 am; Section B—TTh 5:10–8 pm. Second Session: Section C—MWF 8:10–10 pm.

207 Human Behavior in Organizations (3)

Individual, group, intergroup, and other human behavior and development; application of social science research to administration. Learning exercises and practical applications emphasized. First Session: Section A—MWF 6:10–8 pm; Section B—MWF 4:10–6 pm. Second Session: Section C—MWF 4:10–6 pm.

210A Behavioral Factors in the Process of Change (3)

Review of current research, theory, and practice related to the process of change. Basic principles of planned change; individual, group, organization, community, and cultural change. Emphasis on human behavior research and theory related to the change process. Prerequisite: Mgt 208. First Session: MWF 4:10–6 pm.

225A Managerial Statistics I (3)

The mathematics of probability and statistics and its applications in management science and operations research. Topics include random variables; discrete and continuous probability distributions; moments and other descriptive measures; sampling theory; and an introduction to statistical estimation, hypothesis testing, and regression analysis. Prerequisite: Mgt 203 or equivalent. First Session: MWF 8:10–10 pm.

226B Managerial Statistics II (3)

Management applications of the theory and techniques of mathematical statistics. Topics include maximum likelihood and other methods of estimation, hypothesis testing, descriptive measures of bivariate distributions,

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* A special section of this course, Mgt 201D, for students in the Navy Graduate Financial Management Program, will be offered July 22 to August 23; hours to be arranged.

regression and correlation, analysis of time series, econometric models and multiple regression, statistical decision theory, and the revision of probabilities in decision-making. Prerequisite: Mgt 225. Second Session: MWF 6:10–8 pm.

240A **Survey of Information Technology** (3)

A management-oriented presentation of the vocabulary, concepts, and trends in computer hardware and software, information systems design and development, organizational impact, and effective management; milestones of past and current research; computer technology as a rapidly evolving force of major significance in business, government, and industry. Designed for students without prior information technology experience who do not plan to take additional information technology courses. First Session: MWF 6:10–8 pm.

241A **Management Information Systems Development and Application** (3)

For students in the Navy Graduate Financial Management Program only. Contemporary theories and practices in the development of management information systems. Participation in the design of information systems specifications. The roles of both management and systems design personnel in the systems development process studied and evaluated. Impact of management information systems upon the organization and its decision-making processes evaluated. Case studies. Prerequisite: an introductory course in information technology, or permission of instructor. May 27–July 19: As arranged.

249B **Seminar: Information Technology** (3)

Current problems in the design and implementation of computer-based systems; emphasis on current state-of-the-art through discussion with leading experts in the field, analysis of literature. Prerequisite: Mgt 241, 242, 243; or permission of instructor. Second Session: MWF 8:10–10 pm.

Mathematics

P.G. Liverman, *Chairman*

3A **College Algebra** (3)

Equivalent to the standard two years of high school algebra with several additional topics. Prerequisite: one year each of high school algebra and high school geometry. First Session: MTWThF 6–7:20 pm.

6B **Plane Trigonometry** (3)

Prerequisite: two years of high school algebra and one year of high school geometry, or Math 3 (or concurrent registration therefor). Second Session: MTWThF 6–7:20 pm.

9 **General Mathematics I** (3)

For students electing Math 9 and 10 as a terminal sequence. Logic, sets, number systems. Prerequisite: two years of high school mathematics. First Session: Section A—MTWThF 8:10–9:30 am. Second Session: Section B—MTWThF 4:10–5:30 pm.

10B **General Mathematics II** (3)

Mathematical systems, geometry, and introduction to statistics and prob-

ability. Prerequisite: Math 9. Second Session: MTWThF 8:10–9:30 am.

30 Precalculus (3)

Set theory inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. Prior to registration, new students must take a placement examination in algebra and trigonometry. First Session: Section A—MTWThF 7:35–8:55 pm. Second Session: Section B—MTW ThF 9:40–11 am.

31 Calculus of One Variable (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent.* First Session: Section A—MTWThF 9:40–11 am. Second Session: Section B—MTWThF 7:35–8:55 pm.

32 Calculus of Several Variables (3)

Vectors, determinants, partial derivatives, multiple integrals, curves. Prerequisite: Math 31. First Session: Section A—MTWThF 6–7:20 pm. Second Session: Section B—MTWThF 9:40–11 am.

33B Calculus of Vector Functions (3)

Differential equations, infinite series, vector calculus, line integrals, Green and Stokes theorems. Prerequisite: Math 32. Second Session: MTW ThF 6–7:20 pm.

51A Mathematics for the Social and Management Sciences I (3)

Notion of function, graph of function; sequences; differential and integral calculus of functions of one variable; exponential and logarithmic functions. New students must take a placement examination in algebra prior to registration. First Session: MTWThF 6–7:20 pm.

52B Mathematics for the Social and Management Sciences II (3)

Functions of several variables; partial derivatives, maxima and minima, Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51. Second Session: MTWThF 6–7:20 pm.

111A Mathematics for Engineers and Physicists I (3)

Differential equations, linear algebra, Fourier series and integral, differential equations of the first order. Prerequisite: Math 32. First Session: MTWThF 7:35–8:55 pm.

112B Mathematics for Engineers and Physicists II (3)

Ordinary differential equations, systems of differential equations, boundary-value problems, partial differential equations. Prerequisite: Math 111. Second Session: MTWThF 7:35–8:55 pm.

124B Introduction to Matrix Theory (3)

Operations on matrices, linear equations, matrix inversion, vector spaces, characteristic roots and vectors, spectral theorem, quadratic forms. Prerequisite: Math 31 or 52. Second Session: MTWTh 5:45–7:25 pm.

* Math 30 may be waived as a prerequisite requirement by examination on scheduled dates.

139A **Advanced Calculus I** (3)

Review and extension of elementary one-variable calculus, emphasis on the theoretical foundations; differential calculus of several variables. Prerequisite: Math 33. First Session: MTWThF 6–7:20 pm.

140B **Advanced Calculus II** (3)

Differential and integral calculus of several variables; contraction maps, implicit function and differential equation theorems. Prerequisite: Math 139 or equivalent. Second Session: MTWThF 6–7:20 p.m.

*165A **Introduction to Theory of Numbers for Teachers** (3)

Selected topics from theory of numbers. Prerequisite: Math 31 or equivalent. First Session: MTWThF 7:35–8:55 pm.

*169B **Proseminar in Mathematics for Teachers** (3)

Topics in mathematics; emphasis on directed individual research. Prerequisite: Math 31 and permission of instructor. Second Session: MTWThF 7:35–8:55 pm.

295 **Reading and Research** (3)

May be repeated once for credit. First Session: Section A: Second Session: Section B.

299–300 **Thesis Research** (3–3)

Math 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

lechanical Engineering

e "Engineering and Applied Science."

edicine†

rett Wise, *Director of the Physician's Assistant Program*

ST SESSION—JUNE 3 TO JULY 10

146A **Core Clerkship** (4)

en only to candidates for the degree of Master of Science for Teachers, teachers for in-service ing, or students recommended by the Department of Education.

ollment limited to students in the Physician's Assistant program in the School of Medicine Health Sciences. Days and hours to be arranged.

149A **Introduction to Surgery** (2)

152A **Laboratory Medicine II** (2)

155A **Emergency Medicine** (1)

156A **Ambulance Service** (1)

158A **Clinical Pharmacology** (2)

160A **Medical Inpatient** (4)

163A **Medical Outpatient** (4)

164A **Pulmonary Medicine** (3)

166A **General Surgery** (3)

169A **Obstetrics and Gynecology** (4)

172A **Pediatric Outpatient** (4)

175A **Primary Care Preceptorship** (12)

178A **Emergency Room** (4)

180A **Cardiology** (3)

181A **Hematology** (3)

182A **Endocrinology** (3)

184A **Gastroenterology** (3)

186A **Nephrology** (3)

187A **Neurology** (3)

188A **Rheumatology** (3)

190A **Dermatology** (3)

192A **Orthopaedics** (3)

194A **Urology** (3)

196A **Radiology** (3)

198A **Psychiatric Outpatient** (3)

Music

George Steiner, *Chairman*

MUSIC HISTORY AND LITERATURE

3 **Introduction to Musical Understanding** (3)
Introductory history of musical styles, related to listening; elements and

materials of music. First Session: Section A—MTWThF 11:10 am–12:30 pm; Second Session: Section B—MTWTh 5:45–7:25 pm.

104B **History of Music** (3)

Development of music in the Western World from Baroque to the present. Second Session: MTWThF 1:10–2:30 pm.

199 **Independent Research** (3)

Under the guidance of an assigned instructor. Open only to qualified Music majors. May be repeated for credit. First Session: Section A; Second Session: Section B. As arranged.

MUSIC THEORY

5–6 **Harmony** (3–3)

Triads, inversions; chord analysis, construction, and progression; part-writing, modulations, altered chords. Prerequisite: Mus 1 or satisfactory passing of placement examination. First Session: Mus 5A; Second Session: Mus 6B. MTWThF 4:10–5:30 pm.

299–300 **Thesis Research** (3–3)

Mus 299A and 300A: both sessions. As arranged.

APPLIED MUSIC

Applied Music courses listed below are offered in both sessions and may be repeated for credit. Each course has individual lessons of 45 minutes twice a week; supplementary fee, $40.

11 **Piano** (1)

First Session: Section A; Second Session: Section B.

13 **Voice** (1)

First Session: Section A; Second Session: Section B.

15 **Organ** (1)

First Session: Section A; Second Session: Section B.

17 **Violin** (1)

First Session: Section A; Second Session: Section B.

19 **Classical Guitar** (1)

First Session: Section A; Second Session: Section B.

21 **Viola** (1)

First Session: Section A; Second Session: Section B.

23 **Cello** (1)

First Session: Section A; Second Session: Section B.

25 **Bass** (1)

First Session: Section A; Second Session: Section B.

27 **Flute** (1)

First Session: Section A; Second Session: Section B.

29 **Recorder** (1)
First Session: Section A; Second Session: Section B.

31 **Oboe** (1)
First Session: Section A; Second Session: Section B.

33 **Clarinet** (1)
First Session: Section A; Second Session: Section B.

35 **Saxophone** (1)
First Session: Section A; Second Session: Section B.

37 **Bassoon** (1)
First Session: Section A; Second Session: Section B.

39 **French Horn** (1)
First Session: Section A; Second Session: Section B.

41 **Trumpet** (1)
First Session: Section A; Second Session: Section B.

43 **Trombone** (1)
First Session: Section A; Second Session: Section B.

45 **Percussion** (1)
First Session: Section A; Second Session: Section B.

47 **Harp** (1)
First Session: Section A; Second Session: Section B.

111 **Piano** (1)
First Session: Section A; Second Session: Section B.

113 **Voice** (1)
First Session: Section A; Second Session: Section B.

115 **Organ** (1)
First Session: Section A; Second Session: Section B.

117 **Orchestral Instrument** (1)
First Session: Section A; Second Session: Section B.

119 **Classical Guitar** (1)
First Session: Section A; Second Session: Section B.

Operations Research

See "Engineering and Applied Science."

Philosophy

Thelma Z. Lavine, *Chairman*

50A Introduction to Philosophy (3)

Readings from major philosophers and of philosophic positions from Plato to the present. First Session: MTWThF 9:40–11 am.

112A History of Modern Philosophy (3)

History of Western philosophy of the 17th and 18th centuries (Descartes to Kant). First Session: MTWThF 11:10 am–12:30 pm.

***127A Theories of History (3)**

Critiques of philosophies of history: idea of progress, historicism, Hegelian-Marxian dialectic, cyclical and social-scientific views. Contemporary problems of historical knowledge. First Session: MTWThF 9:40–11 am.

163B Philosophy and the Film (3)

Examination of aesthetic theories in relation to the film as most familiar and most powerful of 20th century art forms. Readings in aesthetic theory and film criticism. Viewing and critique of about eight films. Second Session: MTWThF 9:40–11 am.

172B American Philosophy (3)

Philosophies of Peirce, Royce, James, Dewey, and Santayana as representatives of American thought. Second Session: MTWThF 8:10–9:30 am.

201–2 Readings and Research (3–3)

Advanced readings and reports. Investigation of special problems. First Session: Phil 201A; Second Session: Phil 202B.

299–300 Thesis Research (3–3)

Phil 299A and 300A: both sessions.

ysical Education, Health, and Recreation

Breen, *Chairman*

e University is not responsible for injuries received in intramural games, or any of the activities of the Department of Physical Education, Health, and creation; and the student assumes full responsibility therefor.

116A Mime Movement Theatre (1)

(Formerly Movement for Actors)

June 3 to 21: MTWThF 11:30 am–1 pm. (See Dance Workshop, page 40.)

118A Special Problems in Dance Composition (1)

June 3 to 21: MTWThF 11:30 am–1 pm. (See Dance Workshop, page 40.)

*Interdepartmental course offered by the departments of Philosophy and History.

*119A **Creative Dance for Children** (3)

Study of dance as an expressive medium for children; emphasis on concepts and principles, methods and materials. Consideration given to dance for children with special education problems. A 3-week course, June 17 to July 5; MTWThF 10–12 am.

120 **Repertory** (1 or 2)

Section A–1 and Section A–2: June 3 to 21—MTWThF 2–3:30 pm. (See Dance Workshop, page 40.)

121A **Dance Technique I** (1)

June 3 to 21: MTWThF 9:30–11 am. (See Dance Workshop, page 40.)

124A **Movement Technique** (1)

June 3 to 21: MTWThF 9:30–11 am. (See Dance Workshop, page 40.)

184 **Workshops in Physical Education** (3)

May 8 to 17: PE 184A—5–9 pm; field activities as arranged (see Movement Education Workshop, pages 43–44). June 17 to July 5: PE 184B—MTWThF 4–6 pm (see Workshop in Comparative European Physical Education and Recreation, page 50).

202A **Conceptual Basis of Motor Learning** (3)

Theories of learning and application to development of motor skills. A 6-week course, June 17 to July 26: MW 6–8 pm; laboratory as arranged.

232A **Current Issues in Elementary School Physical Education** (3)

Current philosophy, trends, and research; implications for curriculum, instruction, evaluation. A 6-week course, June 17 to July 26: TTh 6–8 pm; laboratory as arranged.

239A **Urban Recreation for Special Populations** (3)

Development of recreation for the disabled, impaired, and handicapped using the Baltimore-Washington area as the urban problem setting; development of competencies in community organization, communications, consultation, group dynamics, and interpersonal relations; program development and evaluation. A 6-week course, June 17 to July 26: MW 8–10 pm; laboratory as arranged.

277A **Dance Expressions in Selected Cultures** (3 or 6)

Investigation of traditional dance form through research and field work. Research may be conducted in the field or by use of other techniques. A 6-week course, July 17 to July 26: as arranged.

283A **Supervised Experience in Physical Education, Recreation, or Dance** (3 or 6)

Field work, internship and/or instructional practice, including conference and/or seminar. May be repeated once for credit with permission of adviser. A 6-week course, June 17 to July 26: as arranged.

297A **Advanced Topical Studies** (3)

Independent research and study pertinent to the needs of the student. Prerequisite: Educ 295 or permission of instructor. May be repeated once for

* A course requiring the full daytime attention of enrollees. Concurrent registration for another course scheduled in morning or afternoon not permitted.

credit with permission of the adviser. A 6-week course, June 17 to July 26: as arranged.

For information concerning workshops in Dance, Movement Education, and Comparative European Physical Education and Recreation, see pages 40, 43–44, 50.

Physics

Julian Eisenstein, *Chairman*

1A **General Physics** (4)

Topics in classical physics which form a foundation for modern physics. Prerequisite: two years of college preparatory mathematics or concurrent registration for Math 6. Laboratory fee, $11. First Session: lecture MTTh 1:10–3 pm. Section L: recitation WF 8:10–9:30 am and laboratory MWF 9:40–12 am; Section S: recitation WF 1:10–2:30 pm and laboratory MWF 3:10–5:30 pm.

2B **Introduction to Modern Physics** (4)

Selected topics in modern physics, including relativity and quantum theory. Prerequisite: Phys 1 or equivalent. Laboratory fee, $11. Second Session: lecture MTTh 1:10–3 pm. Section J: recitation WF 8:10–9:30 am and laboratory MWF 9:40–12 am; Section P: recitation WF 1:10–2:30 pm and laboratory MWF 3:10–5:30 pm.

299–300 **Thesis Research** (3–3)

First Session: Phys 299A; Second Session: Phys 300A.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

olitical Science

.L. LeBlanc, *Chairman*

epartmental prerequisite: P Sc 4 and 6 or 5 and 6 are prerequisite to all cond-group courses in Political Science.

4A **Introduction to Political Science** (3)

Introduction to the study of comparative political systems; emphasis on contemporary concepts and techniques used to examine politics and government. Students who receive credit for P Sc 4 cannot receive credit for P Sc 5. First Session: MTWThF 1:10–2:30 pm.

5B **Introduction to Political Science** (3)

Introduction to the study of comparative political systems; emphasis on

structures and processes of major foreign governments and the force of basic ideologies. Students who receive credit for P Sc 5 cannot receive credit for P Sc 4. Second Session: MTWThF 11:10 am–12:30 pm.

6 Introduction to Political Science (3)

Introduction to the study of the structure, powers, and processes of the American political system. First Session: Section A—MTWThF 9:40–11 am. Second Session: Section B—MTWThF 1:10–2:30 pm.

101A Far East in the Modern World (3)

First Session: MTWThF 8:10–9:30 am. (See Russian-East Asian Studies program, pages 45–47.)

103B State Politics (3)

Theory and practice of American federalism, factors influencing state policy choices, state responsiveness to urban problems. Second Session: MTWTh 6:10–7:50 pm.

104A Urban Politics (3)

Demographic trends and implications, local metropolitan political systems, issues in urban politics, strategies of political change. First Session: MTWThF 8:10–9:30 am.

105A Scope and Methods of Political Science (3)

Nature of political inquiry, approaches to the study of politics and government, empirical methods of research. Prerequisite: Stat 51 or 53; or equivalent. First Session: MTWThF 1:10–2:30 pm.

106A The Politics of Social Change (3)

Theories of revolution and change; protest in American politics; urban violence and political change; institutional innovation, reform, and responsiveness; realistic and unrealistic strategies of change. First Session: MTWThF 9:40–11 am.

107A Issues in Modern Political Thought (3)

Issues of modern political thought as seen through major representative thinkers. Emphasis on conservative, liberal, and radical thought. First Session: MTWThF 1:10–2:30 pm.

111B Comparative Government and Politics (3)

Government and politics of the principal constitutional democracies of Western Europe. Second Session: MTWThF 9:40–11 am.

***112 Comparative Government and Politics** (3)

Government and politics of the communist nations; emphasis on the Soviet Union and the countries of Eastern Europe. First Session: Section A—MTWThF 9:40–11 am. Second Session: Section B—MTWThF 11:10 am–12:30 pm.

***115B Government and Politics in Eastern Europe** (3)

Second Session: MTWThF 2:40–4 pm. (See Russian-East Asian Studies program, pages 45–47.)

* P Sc 112 and 115 are related in their subject matter, and credit for only one may be applied toward a degree.

117B **Political Theory: Major Issues of Western Political Thought** (3)

Foundations of Western political thought—Plato to Aquinas. Second Session: MTWThF 4:10–5:30 pm.

121A **U.S. Constitutional Law and Politics** (3)

Separation of powers, federal-state relationships, economic regulation. First Session: MTWThF 11:10 am–12:30 pm.

126A **The American Presidency** (3)

Development of the institution, selection process, role of the Presidency in policy-making. First Session: MTWThF 4:10–5:30 pm.

146A **Public Opinion and Political Socialization** (3)

Sources of mass political attitudes and behavior, effects of mass attitudes and behavior on public policy. First Session: MTWTh 5:45–7:25 pm.

160A **Modern Communist Ideologies** (3)

First Session: MTWThF 4:10–5:30 pm. (See Russian-East Asian Studies program, pages 45–47.)

163A **Soviet Foreign Policy** (3)

First Session: MTWTh 5:45–7:25 pm. (See Russian-East Asian Studies program, pages 45–47.)

167B **U.S. Foreign Policy** (3)

Constitutional and political factors that determine the formulation, execution, and substance of U.S. foreign policy. Second Session: MTWThF 1:10–2:30 pm.

171B **International Politics** (3)

International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy. Second Session: MTWTh 5:45–7:25 pm.

172B **International Organizations** (3)

Development and operations of the United Nations, regional organizations, and functional international organizations. Second Session: MTWThF 4:10–5:30 pm.

177B **Governments and Politics in Latin America** (3)

Political processes and institutions in Latin America; emphasis on Argentina, Brazil, Chile, and Mexico. Second Session: MTWThF 1:10–2:30 pm.

179A **International Relations of the Middle East** (3)

Analysis of the regional and international relations of the Middle East. First Session: MTWThF 11:10 am–12:30 pm.

181B **Public International Law and Organization** (3)

Survey of the public law of nations with emphasis on the law of peace. Second Session: MTWThF 4:10–5:30 pm.

191A **Governments and Politics of the Middle East** (3)

Domestic and international politics of the eastern Arab states, Turkey, Iran, Israel. First Session: MTWThF 1:10–2:30 pm.

193A **Governments and Politics of South and Southeast Asia** (3)

First Session: MTWThF 11:10 am–12:30 pm. (See Russian-East Asian Studies program, pages 45–47.)

*194A **Governments of China and Japan** (3)

First Session: MTWThF 9:40–11 am. (See Russian-East Asian Studies program, pages 45–47.)

297 **Independent Study** (arr.)

Limited to Master's degree candidates. Permission of instructor, in writing, required. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

P Sc 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

For information concerning the special program in Russian-East Asian Studies, see pages 45–47.

Psychology

R.D. Walk, *Chairman*

Departmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses in Psychology. Six semester hours in Psychology courses are prerequisite to all second-group courses in Psychology. The departmental prerequisite may be waived with the permission of the instructor.

Third-group courses are limited to graduate students in Psychology, except by special permission of instructor.

1 **General Psychology** (3)

Fundamental principles underlying human behavior. First Session: Section A—MTWThF 11:10 am–12:30 pm; Section B—MTWThF 4:10–5:30 pm. Second Session: Section C—MTWThF 1:10–2:30 pm.

8B **Psychology of Motivation and Personality** (3)

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and

* P Sc 162 and 194 are related in their subject matter, and credit for only one may be applied toward a degree.

description of personality emphasized. Second Session: MTWThF 1:10–2:30 pm.

22 Introduction to Educational Psychology (3)

The contributions of psychology to education; emphasis on learning. First 3-week Education Workshop Session, June 17 to July 5: Section A—June 17–21, lecture 3:45–5:45 pm, small group discussions—evening; June 24 to July 5, lecture 10:10–12 am, conference 9:10–10 am. Second Session: Section B—MTWThF 1:10–2:30 pm.

29A Psychology of Childhood (3)

Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world. First Session: MTWThF 1:10–2:30 pm.

101 Abnormal Psychology (3)

Causes, diagnosis, treatment, and prevention of various types of maladjustments and mental disorders. Prerequisite: 6 semester hours in psychology, or 3 in psychology and 6 in a biological science. First Session: Section A—MTWThF 1:10–2:30 pm. Second Session: Section B—MTWThF 8:10–9:30 am.

104A Ecology and Mental Health (3)

Examination of the linkages between aspects of the physical environment and mental health. Opportunity for field research in this area. First Session: MTWThF 1:10–2:30 pm.

110B Cognitive and Perceptual Development (3)

Concepts and research in the area of developmental psychology; emphasis on the growth and development of perception, cognition, and language. Second Session: MTWThF 4:10–5:30 pm.

112A Psychology of Adolescence (3)

Psychological characteristics and problems peculiar to adolescence, with emphasis on application of psychology to solution of such problems. First Session: MTWThF 11:10 am–12:30 pm.

115A Psychology of Language and Communication (3)

Introduction to psycholinguistics and verbal behavior. Information theory, generative grammar theory, cultural and linguistic structures in the perception and learning of language. First Session: MTWThF 2:40–4 pm.

117A Psychology of Art and Picture Perception (3)

Theories of Arnheim, Gibson, Gombrich, and Goodman as related to art and picture perception; study of cross-cultural research and research with children. First Session: MTWThF 1:10–2:30 pm.

118A Neuropsychology (3)

Analysis of neural processes underlying behavior. Basic structure and functions of the nervous system; emphasis on sensory processes, learning and memory, motivation, and emotion. First Session: MTWThF 9:40–11 am.

121B Psychology of Learning (3)

Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects. Second Session: MTWThF 11:10 am–12:30 pm.

122A **Psychology and Human Relations** (3)

Understanding human relations and T-group techniques by evolving an ongoing T-group within the course itself. For junior and senior undergraduate social science majors; open to others with permission of instructor. First Session: MTWThF 2:40–4 pm.

129 **Theories of Personality** (3)

Survey of personality theories; emphasis on their application to problems of individuals. First Session: Section A; Second Session: Section B. MTWTh 7:35–9:15 pm.

131B **Psychological Tests** (3)

Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7. Second Session: MTWThF 11:10 am–12:30 pm.

144B **Personnel and Industrial Psychology** (3)

Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation, and productivity. Second Session: MTWThF 4:10–5:30 pm.

150B **Psychology of Sex Differences** (3)

Relevant biological, psychological, and sociological influences on males and females in the development of sex differences: hormonal differences, gender identity, differential socialization of sons and daughters, masculinity/feminity, cultural evaluation of male and female roles. Survey of relevant psychological theory. Emphasis on empirical research and hypothesis testing. Admission by permission of instructor. Second Session: MTWThF 2:40–4 pm.

151B **Social Psychology** (3)

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war. Second Session: MTWThF 9:40–11 am.

156A **Psychology of Attitudes and Public Opinion** (3)

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare. First Session: MTWTh 7:35–9:15 pm.

191 **Independent Research in Psychology** (3)

Opportunity for work on individual library or experimental projects. Open to qualified students by permission; arrangements must be made with the sponsoring faculty member prior to registration. May be repeated once for credit. First Session: Section A; Second Session: Section B.

196A **History and Systems of Psychology** (3)

Senior capstone course which includes a survey and integration of the major viewpoints and concepts of psychology. Required of Psychology majors. First Session: MTWThF 9:40–11 am.

211A **Assessment of Cognitive Functioning** (3)

Concepts of intelligence and achievement and their assessment through a variety of group and individual procedures. Emphasis on evaluation of

children. Material fee, $7. Admission by permission of instructor. First Session: MWTh 4:10–6 pm.

212A **Personality Assessment by Projective Techniques** (3)

Methods of personality assessment, including psychometric and projective tests. Material fee, $7. Admission by permission of instructor. First Session: MWTh 6:10–8 pm.

215A **Personality Assessment by Multiple Procedures** (3)

Consideration and use of a wide range of procedures in assessment of personality and psychopathology of children. Prerequisite: Psyc 207–8 or 211 and 212. Graduate students in fields other than Psychology admitted by permission of instructor. Material fee, $7. First Session: MWTh 6:10–8 pm.

218A **Seminar: Systems of Psychotherapy** (3)

Introduction to theory and technique of psychotherapeutic approaches: psychoanalytic, ego-centered, nondirective, transactional, and others. Original sources surveyed. Limited to graduate students in clinical psychology except when offered in Summer Sessions. First Session: MWTh 4:10–6 pm.

246A **Seminar: Personnel Measurement Techniques** (3)

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, and performance ratings. First Session: MWTh 4:10–6 pm.

272B **Seminar: Theories of Personality** (3)

Emphasis on theoretical problems and methodology in the field of personality study. Second Session: MWTh 4:10–6 pm.

289A **Seminar: Current Topics in Experimental Psychology** (3)

Review and discussion of contemporary research and theory in a specialized field of psychological study, by leaders in the field. Independent topics each time the course is offered; may be repeated for credit. First Session: As arranged.

295 **Independent Research in Psychology** (3)

Individual library or experimental research under supervision of staff member. Arrangements must be made with sponsoring faculty member prior to registration. May be repeated once for credit. First Session: Section A; Second Session: Section B.

99–300 **Thesis Research** (3–3)

Psyc 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy comprehensive examinations. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Public Administration

D.S. Brown, *Chairman*

213A **Administration in Government** (3)

Critical analysis of federal administrative organizations as an integral part of the political system. Roles of Congress, the President, the courts, interest groups, political parties, and the public in the administrative process; special attention to centripetal and centrifugal forces. First Session: MWF 6:10–8 pm.

223A **Behavioral Factors in Large Organizations** (3)

Analysis of the nature and characteristics of bureaucracy; dysfunctionalism; approaches to policy guidance and leadership, particularly in large public organizations; influence and control systems. First Session: TTh 6:10–9 pm.

248B **Financing Metropolitan Services** (3)

Analysis of the structure and administration of public finance of local governments. Second Session: TTh 6:10–9 pm.

251B **Governmental Budgeting** (3)

Survey of the basic concepts, principles, and practices in governmental budgeting; interrelationship of planning, programming, and budgeting; their role in the management process. Second Session: MWF 6:10–8 pm.

252A **Problems in Planning, Programming, and Budgeting** (3)

For students in the Navy Graduate Financial Program only. Intensive analysis of developments in federal planning, programming, and budgeting; application of new tools in the decision-making process; evaluation of the system. May 27 to July 19. As arranged.

260B **Seminar: Policy Formulation and Administration** (3)

Analysis in depth of factors and processes involved in policy development with particular attention to selected areas of national policy; development of agency goals and objectives. Second Session: MWF 6:10–8 pm.

295A **Research Methodology** (3)

Survey of research methods; application to problems of Public Administration. First Session: TTh 6:10–9 pm.

Religion

R.G. Jones, *Chairman*

59–60 **History of Religions** (3–3)

Origins, evolution, and contemporary status in historical context. Rel 59: primitive religion and the religions of the East (Hinduism, Buddhism, Taoism, Confucianism, Shinto). Rel 60: religions of the West and Near East (ancient religions, Judaism, Christianity, Islam). First Session: Rel 59A; Second Session: Rel 60B. MTWThF 11:10 am–12:30 pm.

111A **Myth, Epic, and Novel** (3)

Exploration of the religious themes and cultural significance of literature: e.g., Indian and Babylonian epic; the Bible; Greek epic and drama; Dante and Milton; Dostoevsky, Kafka, Hesse, Faulkner, Beckett, and Clark. First Session: MTWThF 5:45–7:25 pm.

124B **Contemporary Movements in Theology** (3)

Theological approach and systems of a selected number of modern theologians. Second Session: MTWThF 5:45–7:25 pm.

137A **The Land of Israel and the Growth of the Western Religions** (6)

(See Summer Institute in Israel, page 48.)

172A **Religion in American Culture** (3)

Growth of religious bodies and institutions in relation to American culture, development of religious thought, and analysis of the contemporary religious scene. First Session: MTWThF 9:40–11 am.

291–92 **Readings and Research** (3–3)

Investigation of special problems. First Session: Rel 291A; Second Session: Rel 292B.

299–300 **Thesis Research** (3–3)

Rel 299A and 300A: both sessions.

For information concerning the Summer Institute in Israel, see page 48.

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e "Slavic Languages and Literatures."

lavic Languages and Literatures

A. Moser, *Chairman*

acement Examination: A student who has not been granted advanced standand who wishes to continue in college the language begun in high school st take a placement examination before registration. Upon completion of examination, assignment is made to the appropriate course.

5–6 **Intensive Beginning Russian** (6–6)

Beginners' intensive course in the fundamentals of Russian. Prerequisite to Slav 6: Slav 2 or 5. Laboratory fee, $17.50 a session. First Session: Slav 5A; Second Session: Slav 6B. Classroom—MTWThF 9:30–11:30 am and 12:30–2:30 pm, laboratory—TTh 3:10–4 pm.

47A **Beginning Russian for Reading** (3)

For students with little or no knowledge of Russian who wish to learn to read the language only. Credit assigned only after completion of Slav 49. No academic credit for graduate students. First Session: MTWTh 5:45–7:25 pm.

49B **Russian Reading** (3)

Primarily for graduate students preparing for reading examinations in the natural and social sciences. No academic credit for graduate students. Prerequisite: Slav 47 or equivalent. Second Session: MTWTh 5:45–7:25 pm.

91–92 **Introduction to Russian Literature** (3–3)

Emergence and development of Russian literature and ideas from earliest times to the early 20th century—in English. First Session: Slav 91A; Second Session: Slav 92B. MTWTh 7:35–9:15 pm.

Sociology

R.G. Brown, *Chairman*

Departmental prerequisite: Soc 1 is prerequisite to all second- and third-group courses in Sociology.

1A **Introductory Sociology** (3)

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior. First Session: MTWThF 9:40–11 am.

2B **Uses of Sociology** (3)
(Formerly American Social Problems)

Introduction to the various methods by which sociologists have approached the investigation of social phenomena. Prerequisite: Soc 1. Second Session: MTWThF 9:40–11 am.

101A **Development of Social Thought** (3)
(Formerly Sociology 61)

Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century. Prerequisite: Soc 1. First Session: MTWThF 11:10 am–12:30 pm.

110A **The Sociology of Work** (3)

Introductory survey of industrial sociology; sociology of occupations and professions; industry-community relations; and analysis of large, complex organizations. First Session: MTWThF 11:10 am–12:30 pm.

124B **Medical Sociology** (3)

Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services. Second Session: MTWThF 1:10–2:30 pm.

126A **Urban Sociology** (3)

Place of the city in larger society; growth of the city, problems of urban

living, group life, personality, urban housing, city planning, and suburban development. First Session: MTWThF 9:40–11 am.

127B **Population Problems** (3)

Composition of populations, trends in population growth and population pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control. Second Session: MTW ThF 11:10 am–12:30 pm.

129B **Race and Minority Groups** (3)

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice. Second Session: MTWThF 9:40–11 am.

130B **Class, Status, and Power** (3)
(Formerly Social Stratification)

Analysis of distribution of resources and opportunities for participation, education, and social mobility in American society; international comparisons; analysis of public policies which affect these distributions. Second Session: MTWThF 11:10 am–12:30 pm.

133A **Sociology of Education** (3)

Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components. First Session: MTWThF 9:40–11 am.

135A **Juvenile Delinquency** (3)

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders. First Session: MTWThF 1:10–2:30 pm.

136A **Criminology** (3)

Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions in urban society. First Session: MTWThF 9:40–11 am.

139A **Society and the Deviant** (3)

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools. First Session: MTWThF 8:10–9:30 am.

144A **Public Opinion and Mass Communication** (3)

Communication process with emphasis on international communications, propaganda, and mass media; measurement of propaganda campaigns. First Session: MTWThF 9:40–11 am.

149A **Modern Sociological Theory** (3)

Systematic study of contemporary schools of sociological theory, both European and American development; evaluation of scientific contributions of each school. Prerequisite: Soc 101. First Session: MTWThF 1:10–2:30 pm.

195 **Research** (3)

Independent study and special projects. Open only to selected undergrad-

uate students with promising academic records. Before a student is permitted to register for Soc 195, he must submit a written proposal of his plan of study for the approval of the Staff member of the Department who will be directing his research. First Session: Section A; Second Session: Section B.

295 **Research** (arr.)

Independent study and special projects. Before a student is permitted to register for Soc 295, he must submit a written proposal of his plan of study for the approval of the Staff member of the Department who will be directing his research. May be repeated once for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)

Soc 299A and 300A: both sessions.

398A **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. Both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

Spanish

Administered by the Department of Romance Languages and Literatures, J.F. Burks, *Chairman*

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

Departmental prerequisite: Span 3–4 or 6, or equivalent, is prerequisite to all second-group courses in Spanish.

1–2 **First-year Spanish** (3–3)

A year course: credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar, composition, reading of modern Spanish prose. Aural training, oral practice in language laboratory. Laboratory fee, $17.50 a session. First Session: Span 1A; Second Session: Span 2B. Classroom—MTWThF 8:10–9:30 am, laboratory—MTh 10:10–11 am.

3–4 **Second-year Spanish** (3–3)

A year course: credit toward a degree at this University given on completion of Span 4. Conversation, grammar, composition, reading of modern Spanish prose, introduction to Hispanic civilization. Aural training, oral practice in language laboratory. Prerequisite: Span 1–2 or two years of high school Spanish. Laboratory fee, $17.50 a session. First Session: Span 3A; Second Session: Span 4B. Classroom—MTWThF 11:10 am–12:30 pm, laboratory—MTh 9:10–10 am.

9–10 **Spanish Conversation and Composition** (3–3)

Prerequisite: Span 4 or equivalent and permission of instructor. Students who receive credit for Span 9 cannot receive credit for Span 19. First Session: Span 9A—MTWThF 11:10 am–12:30 pm; Second Session: Span 10B—MTWThF 9:40–11 am.

19B **Community Spanish** (3)

Spanish conversation; emphasis on developing linguistic skills necessary for working with the Spanish-speaking community. Class work supplemented by work-study program with social agencies within the Spanish speaking community. Admission by permission of instructor. Students who received credit for Span 19 cannot receive credit for Span 9. Second Session: As arranged.

129A **The Romantic Drama in Spain** (3)

Lectures on the Spanish Romantic Drama, class analysis of representative plays, collateral readings. First Session: MTWThF 1:10–2:30 pm.

141A **Introduction to Spanish American Literature** (6)

Highlights of Spanish American literature through the colonial and modern periods. Of special interest to majors in Latin American Studies. First Session: MTWThF 9:40–11 am and 1:10–2:30 pm.

299A **Thesis Research** (3)

First Session.

pecial Education

erry Botwin, *Chairman*

X-WEEK COURSES—JUNE 17 TO JULY 26

241A **Preprofessional Internship: Crisis-Resource Teaching** (6)

Practicum experience early in the training sequence in crisis-resource teaching. Under the direction of qualified teachers in a field setting. A minimum of 280 clock hours required. As arranged.

NE-WEEK COURSES—JUNE 17 TO AUGUST 16

250A **Specialized Techniques and Materials for Diagnostic-Prescriptive Teachers** (3)

Selected materials and techniques used in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 252. Admission by permission of instructor. As arranged.

252A **Preprofessional Internship for Diagnostic-Prescriptive Teachers** (6)

Supervised school experience in diagnostic-prescriptive teaching. Must be taken concurrently with S Ed 250. Admission by permission of instructor. A minimum of 280 clock hours required. As arranged.

262A **Seminar: the Education of Young Exceptional Children** (3)
Seminar dealing with experiences, problems, and concerns encountered during the internship for the education of young exceptional children. Must be taken concurrently with S Ed 292A. Admission by permission of instructor. As arranged.

292A **Professional Internship in the Education of Young Exceptional Children** (6)
(Formerly Practicum in Teaching Young Children in Special Education)
Supervised internship in the education of young exceptional children. Must be taken concurrently with S Ed 262A. A minimum of 210 clock hours required. As arranged.

294A **Practicum in Diagnostic-Prescriptive Teaching** (9)
Supervised field experience in diagnostic-prescriptive teacher programs. Admission by permission of instructor. As arranged.

FIRST 3-WEEK EDUCATION WORKSHOP SESSION—JUNE 17 TO JULY 5

Classes meet Monday through Friday. Each workshop course requires the full day; concurrent registration for another daytime course is not permitted. June 17 to 21—small group discussions, evening; June 24 to July 5—small group discussions and field work, afternoon.

201A **Introduction to Special Education** (3)
Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accommodate children in a school program. June 17 to 21: lecture 3:45–6:45 pm. June 24 to July 5: 9:10–12 am.

251A **Psychosocial Factors in Special Education** (3)
(Formerly Psychosocial Factors in Diagnostic-Prescriptive Teaching)
Psychosocial factors significant to the process of the special education-school based consultant. Admission by permission of instructor. June 17 to 21: lecture 3:45–6:45 pm. June 24 to July 5: lecture 9:10–12 am.

260A **The Assessment Process: Identification and Psycho-educational Assessment of Young Exceptional Children** (3)
(Formerly Identification and Assessment of the Educational Needs of Young Children)
Lectures, demonstrations, and clinical practice in formal and informal assessment procedures. Admission by permission of instructor. June 17 to July 5: lecture 9:10–12 am.

297A **Individual Study in Special Education** (3)
Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. As arranged.

453A **Doctoral Internship: Special Education** (6)
Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of adviser. As arranged.

491A **Dissertation Research** (arr.)

SECOND 3-WEEK EDUCATION WORKSHOP SESSION—JULY 8 TO JULY 26

Classes meet Monday through Friday. Concurrent registration for another daytime course is not permitted, because each workshop course requires the full day—lecture and conference in the morning; small group discussion and field work in the afternoon.

240B **The Crisis-Resource Teacher** (3)
(Formerly Educational Programming for Children with Behavioral Problems)
Rationales, operational models, techniques, and problems relevant to the implementation of crisis-resource teacher programs. Lecture 9:10–12 am.

261B **The Teaching/Learning Process: Methods and Materials for Young Exceptional Children** (3)
(Formerly Methods for Teaching Young Impaired Children)
Clinical practice in the designing of educational strategies and materials; taught in a special education setting. Admission by permission of instructor. Lecture 6:10–9 pm.

265B **Clinical Experience with Multiply Handicapped and Developmentally Disabled Young Children** (3)
A 3-week intensive field experience in an early childhood special education setting for students with no experience in this area. Supervised experience necessary for program articulation. Required for degree candidates in the specialization area of early childhood special education. Lecture 9:10–12 am.

297B **Individual Study in Special Education** (3)
Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. As arranged.

370B **Intrapersonal Dynamics in Special Education** (3)
Small group exploration of intrapersonal factors essential to understanding roles and interpersonal techniques in teaching exceptional children. Admission by permission of instructor. Lecture 9:10–12 am.

453B **Doctoral Internship: Special Education** (6)
Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of adviser. As arranged.

491A **Dissertation Research** (arr.)

THIRD 3-WEEK EDUCATION WORKSHOP SESSION—JULY 29 TO AUGUST 16

Classes meet Monday through Friday. Concurrent registration for another daytime course is not permitted, because each workshop course requires the full day—lecture and conference in the morning; small group discussion and field work or laboratory in the afternoon.

269C **Psychosocial Concerns of the Early Childhood/Special Educator** (3)
Seminar involving student presentation focusing on sociological and psy-

chological constructs relevant to interpersonal/intrapersonal relationships. Lecture 6:10–9 pm.

298C **Individual Study in Special Education** (3)

Individual study or research under guidance of staff member. Program and conferences arranged with adviser. Admission by permission of adviser. As arranged.

454C **Doctoral Internship: Special Education** (6)

Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of adviser. As arranged.

491A **Dissertation Research** (arr.)

Speech and Drama

Chairman to be announced.

1 **Communicative Speaking and Listening** (3)

Basic theories and principles of speech communication; composition, delivery, and criticism of speaking in interpersonal, group, and public situations. Recording fee, $2. First Session: Section A—MTWThF 9:40–11 am. Second Session: Section B—MTWThF 1:10–2:30 pm.

11A **Voice and Diction** (3)

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4. First Session: MTWThF 11:10 am–12:30 pm.

45B **Understanding the Theatre** (3)

The art of the theatre; its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through lectures, visiting artists, class discussions, and attendance at theatrical performances. Primarily for nonmajors. Second Session: MTWThF 4:10–5:30 pm.

106A **Introduction to Audiology** (3)
(Formerly Sp&D 182)

June 17 to July 18: MTWTh 1–2:40 pm. (See Summer Institutes in Speech Pathology and Audiology, pages 48–50.)

*111B **Business and Professional Speaking** (3)

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. August 10 through November 16.

* Limited to candidates in the Bachelor of Science in Health Care Administration degree program offered at the Naval School of Hospital Administration, Bethesda, Md.

115A **Acting** (3)

Study and practice of fundamentals of acting technique: sense memory, improvisation, character analysis, role development. Prerequisite: Sp&D 32. First Session: MTWThF 4:10–5:30 pm.

119B **Clinical Procedures for Communication Disorders** (3)

July 22 to August 15: MTWTh 9:20–11 am. (See Summer Institutes in Speech Pathology and Audiology, pages 48–50.)

121A **Group Discussion and Conference Leadership** (3)

Process of thinking and problem-solving in communities and small groups; methods of leading discussions and conferences. Prerequisite: Sp&D 1 or permission of instructor. First Session: MTWThF 1:10–2:30 pm.

126B **Argumentation and Debate** (3)

Study of the advocacy system; special emphasis on issue identification, use of evidence, and logical proof. Extensive practice in argumentative speaking. Prerequisite: Sp&D 1 or permission of instructor. Second Session: MTWThF 9:40–11 am.

133A **Broadcasting in America** (3)
(Formerly Radio and TV Broadcasting.)

Study of the origins, structure, and nature of American broadcasting with emphasis on the communicative factors and effects of television programming. First Session: MTWTh 5:45–7:25 pm.

154B **Play Directing** (3)

Fundamentals of play directing. Studies in dramatic composition, character analysis, casting, rehearsing, play analysis. Under supervision of instructor, students cast and prepare scenes for presentation. Prerequisite: Sp&D 115. Laboratory fee, $5. Second Session: MTWTh 5:45–7:25 pm.

155–56 **Play Production Practice** (1–1)

Practical work in theatre: assigned production duties, special projects under instructor's supervision. May be repeated for a total of 4 semester hours of credit. Admission by permission of instructor. First Session: Sp&D 155A; Second Session: Sp&D 156B. As arranged.

*192A **The American Cinema** (3)

First Session: T 6:30–9 pm, WTh 6:10–8 pm. (See American Cinema since 1950 program, page 37.)

268 **Clinical Practice in Communication Disorders** (arr.)

First Session: Section A; Second Session: Section B.

278A **Language Disorders II** (3)
(Formerly Advanced Clinical Practice in Speech and Hearing)

June 17 to July 18: MTWTh 9:20–11 am. (See Summer Institutes in Speech Pathology and Audiology, pages 48–50.)

oint offering of the Department of Speech and Drama and the American Studies Program. Stu- may register under either designation.

279A **Language Disorders III** (3)
(Formerly Anatomy and Physiology of Speech and Hearing)
June 17 to July 18: MTWTh 11:10 am–12:30 pm. (See Summer Institutes in Speech Pathology and Audiology, pages 48–50.)

290A **Management of the Hearing-impaired Child** (3)
June 17 to July 18: MTWTh 2:50–4:30 pm. (See Summer Institutes in Speech Pathology and Audiology, pages 48–50.)

294 **Independent Research in Dramatic Art** (arr.)
May be repeated for credit. First Session: Section A; Second Session: Section B.

295 **Independent Research in Speech and Hearing** (arr.)
May be repeated for credit. First Session: Section A; Second Session: Section B.

299–300 **Thesis Research** (3–3)
Sp&D 299A and 300A: both sessions.

For information concerning the American Cinema since 1950 program and the Summer Institutes in Speech Pathology and Audiology, see pages 37, 48–50.

Statistics

Jerome Cornfield, *Chairman*

Departmental prerequisite: one entrance unit in algebra is prerequisite to all first-group courses in Statistics.

Stat 51, 53, and 91 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree.

49B **The Language of Statistics** (0)
For Master's degree candidates and doctoral students in the Graduate School of Arts and Sciences as a minimum option in lieu of a foreign language. No academic credit. Tuition fee, $270. Second Session: MTWTh 4:10–5:30 pm.

51B **Introduction to Business and Economic Statistics** (3)
Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, time series, index numbers. Laboratory fee, $18. Second Session: lecture MTWThF 9:40–11 am, laboratory as arranged.

53 **Introduction to Statistics in Social Science** (3)
Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, correlation, analysis of variance. Laboratory fee, $18. First Session: Section A—lecture MTWTh 11:10 am–12:45

pm, laboratory as arranged. Second Session: Section B—lecture MTW ThF 11:10 am–12:30 pm, laboratory as arranged.

91A **Principles of Statistical Methods** (3)

Variables and attributes, averages and dispersion, frequency distributions and their characteristics, regression and correlation, statistical decision processes. Laboratory fee, $18. First Session: lecture MTWThF 1:10–2:30 pm, laboratory as arranged.

97A **Introduction to Computer Programming** (3)

Computer and programming concepts. High-level language programs written by students will be run on the University computer. Laboratory fee, $25. First Session: lecture MWF 6–7:20 pm, laboratory TTh 6–7:20 pm.

117B **Analysis of Variance** (3)

Introduction to the design of experiments and analysis of variance; random block, factorial, Latin square, and analysis of covariance. Prerequisite: Stat 118. Laboratory fee, $18. Second Session: lecture MTWTh 5:45–7:25 pm, laboratory as arranged.

118A **Regression Analysis** (3)

Regression and correlation theory; simple, partial, and multiple. Prerequisite: 3 semester hours selected from Stat 51, 53, 91, 107. Laboratory fee, $18. First Session: lecture MWF 5:10–7 pm, laboratory TTh 5:10–6 pm.

119A **Bases of Statistical Decision-making** (arr.)

For students in the Navy Graduate Financial Management Program only. Introduction to techniques of decision-making; emphasis on applications rather than theory. May 27 to July 19: As arranged.

205A **Data Analysis for Educational Policy Decisions** (3)

First Session: lecture MW 6:10–8:30 pm, laboratory as arranged. (See Data Analysis for Educational Policy Decisions, page 41.)

206A **Factor Analysis** (3)

Concepts of factor analysis and their utility in various phases of research and related topics. Prerequisite: Stat 105 or equivalent. Laboratory fee, $18. Not open to graduate students in Statistics. First Session: MTW Th 4:10–5:30 pm.

299–300 **Thesis Research** (3–3)

Stat 299A and 300A: both sessions.

399A **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. Both sessions.

For information concerning the Data Analysis for Educational Policy Decisions program, see page 41.

Urban and Regional Planning

D.C. McGrath, Jr., *Chairman*

201A **Introduction to Urban Planning** (3)

Introduction to history, concepts, and activities of urban planning. Discussion of trends in urbanism and the influences of technical and social change. First Session: TTh 6:10–9 pm.

205B **Urban Housing** (3)

Examination of the housing problem: housing market characteristics, analytical techniques, national needs, costs, financing, federal programs, technology, rehabilitation, and policy formulation. Prerequisite: U&RP 201. A 6-week course, July 11 to August 23: MW 6:10–9 pm.

207B **Land Development Planning** (3)

Selected problems in urban and regional planning: applications of zoning, urban renewal, and special programs available for the implementation of development plans. Prerequisite: U&RP 201 or permission of instructor. A 6-week course, July 11 to August 23: TTh 6:10–9 pm.

209A **Urban Transportation Models** (3)

Consideration of land use activity, trip generation and distribution, modal choice models, traffic assignment, and decision-making techniques. Review of detail studies, calibration, interactions, applications, and accuracy limitations of various mathematical models. Prerequisite: U&RP 208 or permission of instructor. First Session: MW 6:10–9 pm.

213A **Social Factors in Urban Planning** (3)

Consideration of the impact of social groups, social class, and social institutions in urban structure; the development of techniques for reflecting social variables in the planning process. Prerequisite: U&RP 201 or permission of instructor. First Session: MW 6:10–9 pm.

295 **Urban Research** (3)

Directed research and investigation of special problems in community development. May be repeated once for credit. First Session: Section A; Second Session: Section B.

299A **Thesis Seminar** (3)

Both sessions: As arranged.

300A **Thesis Research** (3)

Both sessions.

APPENDIX: RECENTLY ESTABLISHED REGULATIONS

THE FOLLOWING UNIVERSITY REGULATIONS are under review and may be subject to change in connection with the establishment of judicial processes. Bulletins and handbooks incorporating any changes will be issued as appropriate.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on October 19, 1968:

Whereas, safety and order are essential preconditions of the learning process, and indeed of the very concept of a university; and

Whereas, The George Washington University is committed to protection of free speech and freedom of assembly, and to safeguarding the right of lawful protest on campus; and is committed equally to maintaining the peace and safety of the campus, in the knowledge that all rights are in jeopardy when violence and civil disorder prevail over law and reason;

Now, therefore, be it resolved by the Senate of The George Washington University: that in the event a demonstration at this University exceeds the bounds of free assembly and lawful advocacy, and demonstrators are engaging in unlawful acts which cause or imminently threaten injury to persons or property, or which obstruct or interfere with normal and necessary University activities, this body affirms the authority of the President, or other University officials designated to act in his absence, to take such reasonable steps, if possible after consultation with the Chairman of the Executive Committee of the University Senate* and the President of the Student Body, as are required to restore and preserve order; including, if deemed necessary and appropriate, suspension of students or faculty engaging in such acts, and use of such law enforcement personnel as are needed to effect the removal, arrest, and prosecution of law violators. Any such suspension shall be reviewed by an appropriate tribunal as soon after order is restored as is practicably possible.

The following was approved by the University's Board of Trustees on October 19, 1968:

Any student suspended from The George Washington University on the grounds of exceeding the bounds of free assembly and lawful advocacy shall have his suspension reviewed by the Hearing Committee on Student Affairs† of The George Washington University as soon after order is restored as is practicably possible.

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*The University Senate has been renamed the Faculty Senate.

†The duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

The following resolution, submitted by the Student Life Committee, was approved by the University's Board of Trustees on October 19, 1968:

Be it resolved that The George Washington University: affirms its traditional commitment to freedom of expression (a) by continuing to permit business and government organizations which are recruiting employees to conduct their activities at designated places on campus, and (b) by placing no obstacle to students who may wish to protest the presence of such recruiters, provided, however, that such protest shall be orderly and shall not impede or disrupt the recruiter in his activities.

The University affirms its place as a forum for the free exchange of ideas (a) by assuring that guests invited to speak on this campus at duly scheduled meetings shall have the right to appear and to be heard, and (b) by sanctioning the freedom of students to express dissent from the views of the speaker, provided, however, that that expression of dissent be orderly and nonobstructive.

The University distinguishes between orderly protest and resistance-by-obstruction; it accepts the former as a legitimate expression of dissent while rejecting the latter as an abridgement of the freedoms of the individuals who may be its object.

The following was approved by the University's Board of Trustees on October 19, 1968*:

The George Washington University is opposed to discrimination based on race, color, creed, sex, or national origin. Such discrimination may have appeared in campus organizations in the past. In the future, however, no organization can be recognized or supported by the University unless it provides continued assurance of nondiscrimination in membership practices and in intent, considered adequate by relevant committees and officers of the University.

The following was approved by the University's Board of Trustees on October 19, 1968:

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of certain drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Board of Trustees reaffirms the responsibility of the President and the Faculty to continue to implement this policy.

The following resolution, submitted by the University Senate, was approved by the University's Board of Trustees on January 16, 1969:

Be it resolved by the Senate of The George Washington University: Any member of the University (including as members of the University all persons having a formal connection with the University)

(a) who engages in conduct that unreasonably obstructs teaching, research, and learning, or

(b) who unreasonably obstructs free access to members or guests of the University or to University buildings, or

(c) who disobeys general regulations of the University, or

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* Amended January 18, 1973.

(d) who damages University property or injures members or guests of the University,

may be punished for his conduct by dismissal from the University, or by some lesser disciplinary action, through procedures established within the University for the government of its members.

In order to insure due process, any student subject to dismissal or other disciplinary action on the grounds of violating any of the premises of this resolution shall have, at his discretion, the right of review of the action by the University Hearing Committee on Student Affairs.*

* duties and functions of the Hearing Committee on Student Affairs are now performed by the Student-Faculty Committee on Appeals.

ANNUAL ISSUES OF THE UNIVERSITY BULLETIN

Requests for the following publications must include your zip code and should be addressed as indicated.

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NATIONAL LAW CENTER, Dean of the Center

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SCHOOL OF MEDICINE AND HEALTH SCIENCES, Admissions Office, School of Medicine and Health Sciences

SUMMER SESSIONS CATALOGUE, Dean of the Summer Sessions

SCHEDULE OF CLASSES: FALL AND SPRING SEMESTERS, Registrar

SCHEDULE OF CLASSES: SUMMER SESSIONS, Dean of the Summer Sessions

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